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## Measuring the Benefits of Homeowning: Effects on Children

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**MEASURING THE BENEFITS OF HOMEOWNING:  
EFFECTS ON CHILDREN**

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Measuring the Benefits of Homeowning:  
Effects on Children

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# Measuring the Benefits of Homeowning: Effects on Children

## Abstract

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The U.S. government devotes substantial resources to encouraging households to buy rather than rent housing, but there has been little research examining whether homeowning generates benefits great enough to justify the resources devoted to it. In this paper, we examine whether children of homeowners behave in socially more desirable ways than children of renters. In particular we test whether—controlling for other factors—children of homeowners stay in school longer, have a lower probability of being arrested, or are less likely to have children themselves while they are teenagers. Four different data sets are used. We also consider the possibility that selection bias might be responsible for the importance of homeowning in explaining children's behavior. Homeowning might appear to be a significant determinant of children's success not because it is important *per se*, but because it captures the unmeasured effect of differences among parents.

The probit results are remarkably consistent: all four data sets support the hypothesis that homeowning by parents is a statistically significant determinant of whether their children stay in school. On average, children of homeowners are found to have a 15 percentage point higher probability of staying in school when parents' income is low. In addition, children of homeowners are found to have a 2 to 4 percentage point lower probability of having children themselves by age 18. Children of homeowners also are found to have a lower probability of being arrested, but the difference is only statistically significant at the 10% level. Using an endogenous switching model which explains both parents' tenure choice and children's stay-in-school decision, we do not find evidence of selection bias.

We also use cost-benefit analysis to examine whether the benefits of homeowning would justify a government policy of giving low income first-time homebuyers a one time tax credit of \$5,000.

## Measuring the Benefits of Homeowning: Effects on Children

Richard K. Green and Michelle J. White

At least as far back as the 1920's, it has been an article of faith among policy makers that homeowning is desirable and should be encouraged. These quotations are illustrative: Herbert Hoover: "A family that owns its own home takes pride in it and has a more wholesome, healthful, and happy atmosphere in which to bring up children"; Franklin D. Roosevelt: "A nation of homeowners is unconquerable"; and Lyndon B. Johnson: "Owning a home can increase responsibility and stake out a man's place in his community." More recent policy makers continue to believe in the value of homeowning, although they are less specific about its benefits: George W. Bush: "Homeownership continues to be one of the highest social priorities in America;" former H.U.D. Secretary Jack Kemp: "Democracy can't work without the component that goes to the heart of what freedom is all about—the chance to own a piece of property;" and the Clinton/Gore campaign: "Homeownership and decent housing are an essential part of the American Dream."<sup>1</sup> Policy makers have consistently been willing to back up these sentiments with public funds: the Office of Management and Budget calculates that allowing owners to deduct property taxes and mortgage interest payments from taxable income cost the Federal government \$55 billion in foregone tax revenues in 1993 and allowing homeowners who are over 55 to exclude \$125,000 in capital gains on housing from tax cost an additional \$4.4 billion.<sup>2</sup>

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<sup>1</sup> Quotations are taken from Stegman, Quercia, McCarthy and Rohe (1991), except for that from the Clinton/Gore campaign, which comes from "Clinton/Gore on Affordable Housing for All Americans" (campaign statement).

<sup>2</sup> See Office of Management and Budget (1992, table 24-1, Part Two, p. 26). An alternate means of measuring the cost of favorable tax treatment of owner-occupied housing would be to examine the reduction in Federal tax revenue that results from excluding imputed rent on owner-occupied housing from taxable income. However, the O.M.B. does not include this in its computations of tax expenditures. Note that

These statements—and particularly those of Hoover, Roosevelt and Johnson—are in effect claiming that homeownership is a means to a set of policy ends: homeownership should be encouraged because homeowners take greater responsibility for their families, their communities and their country, and provide a better environment for their children. In the paper, we test this view by examining whether children of homeowners behave in socially more desirable ways than children of renters. In particular we test whether—controlling for other factors—children of homeowners stay in school longer, have a lower probability of being arrested, or are less likely to have children themselves while they are teenagers.

How might homeownership affect the behavior of children of homeowners? One view is that when people own their own homes, they invest in homeownership skills by learning to do some maintenance jobs themselves, such as painting and doing repairs. They often acquire these skills even though they hate painting and using tools, because otherwise the house deteriorates and the homeowner bears the loss. Homeowners also may learn interpersonal skills by hiring professionals such as plumbers and roofers, by trading home repair work or do-it-yourself advice with neighbors, or by pestering City Hall to provide better services. The learning-by-doing model suggests that the cumulative experience of maintaining a house may cause homeowners to become better at managing their immediate environments. Further, these skills may be transferable from home maintenance to other areas: thus as homeowners learn to manage their home environments, they may gradually become more likely to join community groups, vote, take adult education courses that help them to get better jobs, and/or take better care of their children. Becoming a homeowner may therefore benefit homeowners themselves, homeowners' neighborhoods and homeowners' children. In contrast, renters are never forced to manage their home environments, so they never acquire these transferable skills.<sup>3</sup>

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rental housing is also treated favorably by the U.S. tax code, although its tax treatment has changed frequently in recent years. See Gordon, Hines and Summers (1987).

<sup>3</sup> In the learning by doing literature, greater cumulative experience with the production process reduces production costs and the benefits may accrue either internally to the firm itself based on its own past production level or externally to other firms based on all firms' past production levels. See Fudenberg and Tirole (1983) and Irwin and Klenow (1993). The implicit model here is somewhat more general because the cumulative investment in homeownership skills is hypothesized to reduce both the cost of maintaining the home and the cost of performing other activities.

An alternative view is that children of homeowners do better than children of renters, not because their parents are homeowners, but because their parents are different. In this view, some parents are more likely both to buy homes and to bring up successful children, while other parents are more likely both to rent and to bring up less successful children. If this view is correct, then homeownership could appear to be a significant determinant of children's success because it captures the unmeasured effect of parents' personality type rather than because it is important *per se*. We consider this possibility below.

Most economists would probably disagree with the notion that homeownership could affect behavior: they tend to view whether a household owns or rents to be merely a financial decision with tax consequences. Research by economists on owner-occupied housing has instead focussed on the fact that Federal tax treatment of homeownership gives households an incentive to consume too much housing. Regardless of the amount of housing that households consume, they can deduct mortgage interest and property taxes from taxable income and imputed rent on housing is not included in taxable income. As a result, the per unit price of housing falls and households have an incentive to increase their housing consumption. Economists have argued that U.S. households consume too much housing, thereby reducing funds for more productive investments in plant and equipment.<sup>4</sup> They have also examined the distributional impact of the tax treatment of owner-occupied housing and have concluded that the benefits go disproportionately to upper income households.<sup>5</sup>

The paper is organized as follows. In section 2, we investigate simple probit models of whether parents' tenure status affects their children's success, using four different data sets. We find that homeownership by parents has a significant effect on children's success in all four. In section 3, we investigate a model of the stay-in-school decision that attempts to sort out the effects of homeownership *per se* from the effects of differences between parents who choose to own versus rent. Section 4 examines policy implications of our analysis.

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<sup>4</sup> Alm, Follain and Beeman (1985) estimated that the benefit-cost ratio for programs to stimulate housing demand was around .6. Also see Hendershott and Shilling (1982), Rosen (1985), and Mills (1987).

<sup>5</sup> See Rosen (1985) and Follain, Ling and McGill (1993).

## 1. Probit models and results

We start by running probit models explaining whether youths behave in socially desirable ways as a function of whether their families live in owner-occupied housing and other variables. We focus on 17 or 18 year old youths because they are close to becoming independent and thus are at or near the end of the period of direct parental supervision. However, they are still likely to be living with their parents so we can determine whether they live in owner-occupied housing. The behaviors that we examine are, first, whether youths are still in school or have graduated from high school; second, whether youths have a child or children themselves; and, third, whether youths have ever been arrested. Four different data sets are used: the Panel Survey of Income Dynamics (*PSID*), High School and Beyond (*HSB*), the Public Use Microsample of the 1980 Census of Population and Housing (*PUMS*), and the 1989 National Bureau of Economic Research Boston Youth Survey (*BYS*).

### *The PSID*

The *PSID* data set consists of children of *PSID* households who were 17 years old in any of the years 1980-87. The dependent variable equals one if youths are still in school or have already graduated from high school and equals zero if they have dropped out of school. The explanatory variables are whether the youth's household lives in owner-occupied housing, the race of the household head (black equals one), the sex of the youth (female equals one), family income in thousands of 1982 dollars, three dummy variables measuring the household head's educational level: whether the head graduated from high school, attended college or graduated from college (the omitted category is non-high school graduate), whether the household head is female, whether the household head is divorced, family size, and whether the household head worked in the last year.<sup>6</sup> There are 2,074 observations.

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<sup>6</sup> We also tried a set of dummy variables which measure the relevant state's school leaving laws, *i.e.*, whether the state requires that children remain in school until age 17, age 18, or some other age. These were not found to be statistically significant in any of the data sets and are therefore not reported.



Table 1, column 1, gives the results. The homeownership variable is positive and significantly different from zero at better than the 95% confidence level: the  $t$  statistic is 4.9. It thus provides support for policy makers' contention that homeownership matters. Of the other variables, race, family income, and whether the head graduated from high school are also statistically significant, with black youths more likely to drop out of school by age 17 and children of higher income households and children whose parents are high school graduates more likely to be in school at age 17. Since a likelihood ratio test rejects the null hypothesis that the samples of homeowners and renters come from the same population, we also ran the same probit model separately on the subsamples of youths whose parents own versus rent. The results are given in table 1, cols. 2 and 3.<sup>7</sup>

The top portion of table 2 gives the predicted probabilities of 17 year olds being in school at different family income levels, where all variables other than family income are set equal to their mean values. Model 1 gives the predictions from the probit regression reported in table 1, column 1, and model 2 gives the predictions from the probit regressions reported in table 1, columns 2 and 3. In model 1, when family income is \$10,000, children of owner-occupiers have a predicted probability of being in school of .90, compared to .81 for renters—a 9 percentage point differential. The differential falls slowly as family income rises: at the average income level in the sample, it is 8 percentage points and at an income level of \$40,000, it is 6 percentage points. In model 2, the effect of family income is stronger: when family income is \$10,000, children of owners have a 13 percentage point higher probability of being in school than children of renters. The differential falls quickly as family income rises: it is 3 percentage points at the average family income level and minus one percentage point when family income is \$40,000. Overall, evidence from the *PSID* suggests that homeownership has an important effect on the probability of children staying in school until age 17 and that the effect of homeownership is strongest for children of low income households.<sup>8</sup>

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<sup>7</sup> Variable means and standard deviations are given in column 4 of table 1 and similar tables discussed below.

<sup>8</sup> We also ran the same models using the weights which allow the *PSID* to be interpreted as a random sample of the U.S. population. The homeownership variable was still statistically significant and the coefficient remained approximately the same. We also ran the model reported in table 1, column 1, using only

## *The PUMS*

The next data set is the 1980 *PUMS*, which is a one-in-one-thousand sample of households from the 1980 U.S. Census of Population and Housing. We include all households that contained a 17 year old in 1980. The dependent variable is the same as in the *PSID*. The independent variables are similar to those in the *PSID*, except that we also include a length of tenure variable and a variable measuring housing quality. The length of tenure variable measures how many years the household has lived in its present housing unit. It is intended to take account of the fact that owner-occupier households move less frequently than renter households and thus provide a more stable environment for their children. The housing quality variable, which we interpret as a proxy for neighborhood quality, equals rent per year if the housing unit is rented and equals the user cost of housing per year if the unit is owner-occupied.<sup>9</sup> There are 3,234 observations.

The results of the probit regression explaining the stay-in-school decision are given in table 3, column 1. Again the homeownership variable is strongly positive and significant, with a  $t$  statistic of 8.7. Other variables that are statistically significant are race, family income, the household head's education level, family size, and the housing quality measure. These variables imply that youths are more likely to stay in school if they are black, if family income is higher, if the household head graduated from high school or had at least some college, if family size is smaller, and if housing quality is higher. Again, we ran the same probit model on separate subsamples of owner versus renter households. The results are shown in table 3, cols. 2 and 3.

Table 2 shows the predicted probabilities of youths staying in school at different family income levels. Again, model 1 gives the predictions from the probit regression reported in table 3, column 1, and model 2 gives the predictions from the probit regressions reported in table 3, columns 2 and 3. Examining model 1, when family income is \$10,000, children

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households whose income is below the median. We found that the homeownership coefficient was slightly larger and had the same standard error. (These results are not reported.)

<sup>9</sup> The calculation of user cost follows the method described in Green and Henderschott (1993) and takes into account the mortgage interest rate, property taxes, maintenance costs, expected price appreciation, a risk premium, and the household's marginal tax rate. Rent and user cost figures, as well as family income, are in 1980 dollars.

of homeowners have a .90 probability of being in school, compared to .76 for children of renters—a 14 percentage point differential. The differential falls gradually to 7 percentage points at an income level of \$40,000. In model 2, the differentials are even larger. When family income is \$10,000, children of homeowners have a 19 percentage point higher probability of staying in school, but the differential falls to 13 percentage points when family income is \$40,000. Thus evidence from the *PUMS* also suggests that homeownership matters and that its effect is stronger for children of low income households.<sup>10</sup>

### *HSB*

Now turn to the data set from *HSB*. Here the data come from a follow-up survey in 1982 of the original 1980 cohort of high school sophomores. The sample is entirely composed of 18 year olds. Again the dependent variable equals one if youths are either still in school or have already graduated from high school and equals zero if they have dropped out of school. The independent variables are similar to those in prior regressions, except that some of the variables measuring household characteristics are not available. Household income is represented as a series of dummy variables for different income ranges, with the omitted category being income less than \$8,000 per year. Because other characteristics suggest that households for whom income is not reported are predominantly low income, we include a dummy variable which equals one if income is missing. We also include a dummy variable which measures whether the youth is handicapped and a dummy variable which equals one if the language spoken in the youth's home is predominantly English. As proxies for the quality of the neighborhood, we include a dummy variable which equals one if the youth attends an academic high school, where the omitted category is any other high school type, and two dummy variables which measure whether the location of the high school is rural or suburban, where the omitted category is urban. There are 10,981 observations.

The results are shown in table 4, column 1. Once again, the homeownership variable is positive and statistically significant, with a *t* statistic of 6.0. Other variables that are

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<sup>10</sup> The homeownership coefficient and its standard error remain approximately the same if the model is estimated using the lower half of the income distribution only.

statistically significant and are associated with a higher probability of youths staying in school are being black, being female, having a parent who graduated from high school or attended or graduated from college, living in a female-headed household, living in a family that speaks English at home, and attending an academic high school. Having a handicap, living in a household headed by a single parent, or being in a household whose income is missing are associated with a lower probability of youths staying in school. We also ran the same probit model separately for children of owners versus renters and the results are shown in columns 2 and 3 of table 4. Again a likelihood ratio test rejects the null hypothesis that the two samples are drawn from the same population.<sup>11</sup>

Table 2 shows the predicted probabilities of youths staying in school, evaluated at the average family income level and evaluated separately for households whose income is not reported. Again, model 1 gives the predictions from the probit regression in table 4, column 1, and model 2 gives the predictions from the probit regressions in table 4, columns 2 and 3. In both models, children of owners have a probability of .99 of being in school and children of renters have a probability of .98 of being in school when family income equals the average level. An artifact of the *HSB* data is that virtually all respondents who answered the question about family income also graduated from high school. Therefore the probability of youths staying in school does not vary with income. The results suggest that the effect of homeownership on children's stay-in-school decision is very small. However, we also evaluated the predicted probabilities of youths staying in school for households whose income is missing since, as noted above, these households appear to have low income. In model 1, the predicted probability of children of owners staying in school is .87 if family income is missing, compared to .80 for children of renters—a differential of 7 percentage points. In model 2, the differential increases to 27 percentage points.<sup>12</sup>

We also use the *HSB* data set to investigate whether homeownership by parents affects the probability of youths having a child or children by age 18. Having a child during high school is assumed to be undesirable since it reduces the probability of youths finishing high

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<sup>11</sup> Note that black youths are more likely to stay in school in the PUMS and the BYS and less likely to stay in school in the PSID—results which we do not attempt to explain.

<sup>12</sup> There are about 200 households for whom income is not reported.

school and increases the likelihood—particularly for young women—that they will be poor and unable to provide a stable environment for their children. The independent variables are the same as in the previous equation and the results are shown in table 5, column 1. They show that children of homeowners are significantly less likely than children of renters to have a child by age 18—the *t* statistic is 2.25. Other variables that are statistically significant and are associated with an increased probability of youths having a child by age 18 are being black, being female, having a handicap, living in a household headed by a single parent, and living in a household whose income is not reported. Variables that are statistically significant and are associated with a decreased probability of youths having a child by age 18 are living in a household with an income level above \$40,000 per year, living in a household with a female head, having a parent who attended or graduated from college, attending an academic high school, and living in rural or suburban settings. We also ran the same regression for the subsamples of sons and daughters. The results are given in table 5, columns 2 and 3. They show that homeownership by parents is significantly related to whether daughters have children by age 18, but is not significantly related to whether sons have children by age 18.

Table 6 gives the predicted probabilities of youths having children. The results on the left are for youths of both sexes and are based on the model in table 5, column 1; while the results on the right are for daughters only and are based on the model in table 5, column 3. At the average family income level, children of homeowners have a predicted probability of .09 of having a child or children by age 18, compared to .10 for children of renters—a one percentage point differential. For children of households whose income is missing, the figures jump to .21 for children of owners and .24 for children of renters—a 3 percentage point differential. For daughters, the effects of homeownership are slightly larger: daughters of homeowners have a two percentage point lower probability of having children by age 18 at the average family income level and a 4 percentage point lower probability of having children by age 18 if family income is missing. Thus the evidence suggests that homeownership by parents also has some effect on whether their children—particularly their daughters—have children of their own while they are teenagers.

## *The BYS*

Turn now to the *BYS*. This survey covers youths of age 17 through 25 who live in three high-poverty areas of central Boston. Only 17 and 18 year olds are included in the analysis. Three dependent variables are examined: whether youths are in school or have graduated from high school, whether they have a child or children, and whether they have ever been arrested. The independent variables are similar to those in the previous models, except that we also include two variables that proxy neighborhood quality: a dummy variable measuring whether the youth felt that his/her neighborhood had a crime problem and a dummy variable for whether the youth belonged to a gang.<sup>13</sup> Household income is measured as six dummy variables representing ranges, with the omitted range being income less than \$3,600 per year. A dummy variable is also included which equals one if income is not reported. The education level of the household head is measured as three dummy variables for 12 years of education, 12 to 16 years of education, and more than 16 years of education, with the omitted category being less than 12 years.<sup>14</sup> There are 322 observations.

The results for the stay in school equation are shown in table 7, column 1. Again, children of homeowners are significantly more likely to stay in school until age 17 or 18 than children of renters. Besides homeownership, the only other variable that is statistically significant is race—black youths are more likely to be in school than non-black youths.<sup>15</sup> Since the income variables are not statistically significant, we predict the probability of youths staying in school at the mean income range, which is \$12,000 to \$18,000 per year. Table 2 shows that the predicted probability of children of owners staying in school until age 18 is .91, compared to .76 for children of renters—a 15 percentage point differential.<sup>16</sup>

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<sup>13</sup> The homeownership variable equals one if the youth claimed to live in a “private house you or your family owns.”

<sup>14</sup> The education variables measure the number of years of school of the person who contributes the most money to the household.

<sup>15</sup> A surprising result is that black youths are more likely to stay in school in the *PUMS*, *HSB*, and the *BYS*, but less likely to stay in school in the *PSID*.

<sup>16</sup> Because of the small sample size, we do not run separate probit regressions for owners versus renters.

We also estimate a probit regression explaining whether youths have a child or children by age 18 and the results are shown in table 7, column 2. Because of the small size of the data set, both sexes are combined. Here the homeownership variable is statistically significant at the 5% level, with children of homeowners less likely to have a child by age 18. The only other significant variable in this equation is race, where being black implies a higher probability of having a child by age 18. The predicted probability of youths whose parents are homeowners having a child by age 18, given in table 6, is .03 for youths whose parents are homeowners compared to .09 for youths whose parents are renters—a 6 percentage point differential. Thus the effect of parents' homeownership status on the probability of their children having a child by age 18 is substantial.<sup>17</sup>

Finally, we estimate a probit regression explaining whether youths have been arrested by age 18. (See table 7, col. 3.) The homeownership variable has the expected negative sign—children of homeowners are less likely to be arrested—but is only significant at the 10% level. Variables in the equation that are significant at the 5% level are race, sex and whether the youth belongs to a gang. The results indicate that being black and being female are both associated with lower probabilities of being arrested, while being a gang member has the opposite effect.<sup>18</sup> The predicted probability of youths whose parents are homeowners being arrested is .03, compared with .08 for youths whose parents are renters (see table 6).

### *Summary*

The probit results are remarkably consistent: all four data sets support the hypothesis that homeownership by parents is a statistically significant determinant of whether their children stay in school. Children of homeowners are found to have from a negligible to a 27 percentage point higher probability of staying in school, depending on the data set used and on parents' income, with the differential generally falling as household income

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<sup>17</sup> Evaluating the same equation for daughters, the predicted probabilities of daughters of owners versus renters having a child by age 18 are .04 and .13, respectively.

<sup>18</sup> See Freeman (1991) and Case and Katz (1991) for more detailed examination of neighborhood effects, using the same data set. Freeman also discusses the question of whether respondents tend to under-report crime.

rises. Thus the single equation results support policymakers' contention that homeownership matters. In addition, results from *HSB* and the *BYS* suggest that homeownership by parents reduces the probability that their children have children by age 18 and the relationship is statistically significant. However, homeownership by parents was found to be a statistically significant determinant of whether youths are arrested by age 18 only at the 10% level of significance.

Nonetheless, the possibility remains that the association between homeownership and socially desirable behavior by children of homeowners is spurious. One possibility is that the homeownership variable is acting as a proxy for variation in the type or quality of the neighborhood. Children might behave in socially more desirable ways if they live in more desirable neighborhoods, regardless of whether their parents are homeowners or not. The data set from *HSB* provides us with a measure of whether the student attends an academic high school and whether the student lives in an urban, suburban or rural setting, both of which are rough measures of community characteristics. The *HSB* results therefore provide some measure of reassurance on this score. The *BYS* provides us with measures of whether respondents felt that their neighborhoods had a crime problem and whether respondents themselves belonged to a gang, both of which serve as proxies for neighborhood quality. In the *PUMS*, we proxy for neighborhood quality by using the value of the parent's housing unit. While this variable turns out to be statistically significant and has the predicted sign, the homeownership variable is nonetheless significant and an important determinant of whether 17 year olds stay in school. Thus while it remains possible that the homeownership variables might actually be measuring the effects of neighborhood quality rather than of homeownership *per se*, this seems unlikely. Another possibility is that homeowners move less frequently, so that homeownership serves as a proxy for a more stable home environment. But in the *PUMS*, we measure length of time in the current housing unit directly and the results show that it is insignificant.

Finally, selection bias might be responsible for the importance of homeownership in explaining children's behavior. In the next section, we investigate the possibility of selection bias.



## 2. A Selection Model of the Stay in School Decision

One possible explanation for the importance of homeownership in the simple probit models is that the association between parents' homeownership and children's success is due to selection bias. Parents who own housing may be systematically different from parents who rent housing and the same characteristics that make the former group more likely to own may also make them more likely to bring up successful children. Thus policymakers may be crediting to homeownership the effect of these unobservable differences among households. If we were able to control for differences between parents who choose to own versus rent, we might find that homeownership *per se* is no longer a statistically significant determinant of children's success. To address this issue, we estimate a bivariate probit (endogenous switching) model which explains both parents' tenure decision and children's stay-in-school decision.

Assume that there is a first stage in which parents make the choice between owning and renting and a second stage in which children of owners and children of renters each decide separately whether to stay in school. Fig. 1 shows the model schematically. Node *a* is parents' decision to own versus rent, node *b* is the stay-in-school decision of children of renters and node *c* is the stay-in-school decision of children of owners.<sup>19</sup>

Suppose  $Z$  is a vector of variables affecting parents' tenure choice,  $I^*$  is a measure of parents' propensity to own housing,  $\gamma$  is a vector of parameters, and  $\mu$  is an error term. Parents choose to become homeowners if:

$$I^* = \gamma'Z + \mu > 0 \quad (1)$$

and they choose to rent if this expression is reversed.

Suppose  $J_r^*$  is a measure of the propensity of children of renters to stay in school,  $X$  is a vector of variables affecting children's decision to stay in school conditional on parents' renting,  $\beta_1$  is a vector of parameters, and  $\epsilon_1$  is an error term for renters. Children of renters stay in school until age 17 if:

$$J_r^* = \beta_1'X + \epsilon_1 > 0 \quad (2)$$

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<sup>19</sup> See Hughes and Snyder (1989) and Maddala (1983, pp. 278-80) for discussion and examples.

and they drop out of school by age 17 if (2) is reversed. Finally, suppose  $J_o^*$  is a measure of the propensity of children of owners to stay in school,  $X$  is a vector of variables affecting children's decision to stay in school conditional on parents' owning,  $\beta_2$  is a vector of parameters, and  $\epsilon_2$  is an error term for owners. Children of owners stay in school until age 17 if:

$$J_o^* = \beta_2'X + \epsilon_2 > 0 \quad (3)$$

and they drop out of school by age 17 if (3) is reversed. Note that the vector  $X$  of variables affecting children's decision to stay in school is assumed to be the same for children of renters and children of owners. We assume that the error terms  $\mu$  and  $\epsilon_1$  may be correlated and that the error terms  $\mu$  and  $\epsilon_2$  may also be correlated. Thus estimating the stay in school decision without taking account of the simultaneity problem could produce biased parameter estimates.

We do not observe the variables  $I^*$ ,  $J_o^*$  and  $J_r^*$ , but we do observe the indicator variables  $I$ ,  $J_o$  and  $J_r$ .  $I$  equals one if parents choose to own and zero if parents choose to rent;  $J_r$  equals one if children of renters stay in school until age 17 and zero if they drop out; and  $J_o$  equals one if children of owners stay in school until age 17 and zero if they drop out.

We use FIML to estimate two likelihood functions. The first explains parents' tenure decision and the stay-in-school decisions of children of renters, *i.e.*, it includes the decision nodes  $a$  and  $b$ . The log likelihood function is:

$$\begin{aligned} \ln L_r = \sum_{i=1}^n [ & (I_i) \ln Pr(\mu_i > -\gamma'Z_i) + (1 - I_i)(J_{ri}) \ln Pr(\epsilon_{1i} > -\beta_1'X_i, \mu_i < -\gamma'Z_i) \\ & + (1 - I_i)(1 - J_{ri}) \ln Pr(\epsilon_{1i} < -\beta_1'X_i, \mu_i < -\gamma'Z_i) ] \end{aligned} \quad (4)$$

The first term in (4) is the probability of parents choosing to own, the second term is the probability of parents choosing to rent and their children staying in school and the third term is the probability of parents choosing to rent and their children dropping out of school. The second likelihood function explains parents' tenure decision and the stay-in-school decisions of children of owners, *i.e.*, it includes the decision nodes  $a$  and  $c$ . The log likelihood function is:

$$\begin{aligned} \ln L_o = \sum_{i=1}^n [ & (1 - I_i) \ln Pr(\mu_i < -\gamma'Z_i) + (I_i)(J_{oi}) \ln Pr(\epsilon_{2i} > -\beta_2'X_i, \mu_i > -\gamma'Z_i) \\ & + I_i(1 - J_{oi}) \ln Pr(\epsilon_{2i} < -\beta_2'X_i, \mu_i > -\gamma'Z_i) ] \end{aligned} \quad (5)$$

The first term in (5) is the probability of parents choosing to rent, the second is the probability of parents choosing to own and their children staying in school and the third is the probability of parents choosing to own and their children dropping out. We estimate the vectors of coefficients  $\gamma, \beta_1$  and  $\beta_2$ . Although we estimate (4) and (5) separately, the  $\gamma$  vector is the same in both equations, since the same tenure choice model is estimated over the same population. Also, since the variance of  $\mu$  is not identified, we estimate the two correlation coefficients,  $\rho_1 = \sigma_{\mu\epsilon_1}/\sigma_{\mu^2}$  and  $\rho_2 = \sigma_{\mu\epsilon_2}/\sigma_{\mu^2}$ .

As an example, suppose all parents belong to one of two personality types, *A* or *B*. Type *A* parents generally have low discount rates, so that they both save a high proportion of their incomes and invest heavily in their children. The high level of investment makes children of type *A* parents successful and therefore they tend to stay in school. As a byproduct of saving more, type *A* parents are more likely to buy houses, but this is not assumed to affect their children's success. In contrast, type *B* parents have high discount rates and they save less and invest less in their children. Their children are therefore more likely to drop out of school. Due to their lack of savings, type *B* parents are also more credit constrained and are less likely to buy houses, but again this is not assumed to affect their children's success. Because personality type is not measured, it is part of the error term in the tenure choice decision,  $\mu$ , and also part of the error terms in the two stay-in-school decisions,  $\epsilon_1$  and  $\epsilon_2$ . Since parents' tenure choice is correlated with personality type, the tenure choice term in the simple probit equations discussed in the previous section would capture the effect of parents' personality type. It could therefore be significant because parents' personality type matters even though homeownership is assumed not to matter. However, the selection model would reveal this because the error terms  $\mu$  and  $\epsilon_1$  would turn out to be correlated, as would the error terms  $\mu$  and  $\epsilon_2$ .

On the other hand, suppose now that it is homeownership *per se*, rather than personality type, that affects children's success and their stay-in-school decision. In that case, the omission of personality type as an independent variable in the tenure choice model would have no effect on the error term  $\mu$  and the omission of personality type as an independent variable in the two stay-in-school models would have no effect on the error terms  $\epsilon_1$  and  $\epsilon_2$ . Therefore a finding that  $\mu$  is uncorrelated with either  $\epsilon_1$  or  $\epsilon_2$  would strengthen the

argument that homeownership *per se* matters in children's stay-in-school decisions, rather than homeownership being significant only because it serves as a proxy for parents' personality type or some other unmeasured variable.

We estimate the endogenous switching model, eqs. (4) and (5), using data from the *PSID*. The *PSID* is used because its longitudinal nature allows us to make use of household characteristics in the year when parents last moved to explain parents' tenure choice, while we again use household characteristics in the year when children are 17 to explain children's stay-in-school decision. None of the other data sets allows us to match decisions and time periods in this way. The vector  $Z$  of variables that influences parents' tenure choice is measured during the year of the household's most recent move, assuming that the household moved during the 5 years before the child was 17 years old. If the household's last move was earlier, then—to avoid losing too many observations—the variables in  $Z$  are measured 5 years earlier, *i.e.*, when the child was 12. The variables in the vector  $Z$  are whether the household head is black, family income (in dollars), family size, whether the household head is married, the number of weeks that the household head worked in the previous year, and a series of dummy variables measuring the age of the household head, where the omitted category is age greater than 60. The vector  $X$  consists of variables that influence children's stay in school decisions when they are 17 years old. Variables in  $X$  are whether the household head is black, household income (in dollars), whether the household head is female, and three dummy variables representing the education level of the household head, where the omitted variable is less than 12 years of education. Because of the use of data from earlier years, the size of the sample drops to 840.

Table 8 gives the results. The first column gives the results of estimating eq. (4), where the estimated  $\beta'_1$  vector is in the upper panel and the estimated  $\gamma'$  vector and the correlation coefficient  $\rho_1$  are in the lower panel. The second column of table 7 gives the analogous results for eq. (5). For comparison, the third and fourth columns give the results of re-estimating the two models, but constraining the correlation coefficients to be zero. Only the results for the  $\beta'_1$  and  $\beta'_2$  vectors of coefficients are given the third and fourth columns, since the  $\gamma'$  vector remains the same. The estimated values of the two correlation coefficients in the unconstrained models,  $\rho_1$  and  $\rho_2$ , are small and neither is

significantly different from zero. As a result, we cannot reject the null hypothesis of no selection bias. Also, both correlation coefficients have negative signs. But if an unmeasured factor such as parents' personality type influenced both decisions, then we would expect the two correlation coefficients to have positive signs. Thus the results of the bivariate probit model do not support the selection bias hypothesis.

To summarize, we estimated a bivariate probit model to test for selection bias in the stay-in-school decision and found that we could not reject the null hypothesis of no selection bias. Thus the evidence is consistent with homeownership being important in itself, rather than homeownership being important only because it captures the effect of omitted variables such as parents' personality type.

### 3. Conclusion

The rather surprising result of this paper is that homeownership by parents benefits their children, who are less likely than children of renters to drop out of high school or to have children as teenagers. Both effects are largest for children in low income households. From table 2, the *PSID* results show that children of homeowners have either a 3 or an 8 percentage point higher probability of staying in school until age 17 at the mean value of parents' income using two different estimation methods; while children of low income households have either a 9 or 13 percentage point higher probability. The *PUMS* results show that children of homeowners have either a 10 or a 15 percentage point higher probability of staying in school at the mean value of parents' income using the same two estimation methods; while children of low income households have either a 14 or a 19 percentage point higher probability. The *HSB* results show little effect of homeownership since nearly all respondents that reported household income also graduated from high school, but the differential for households whose income is not reported is 7 or 27 percentage points, depending on the estimation method. For the *BYS*, the differential at the mean value of parents' income is 15 percentage points. Thus the results from four different data sets are consistent in that all except *HSB* show that children of homeowners are more likely to stay in school until age 17 than children of renters at the mean value of parents' income and all four data sets show that homeownership has an even larger effect on

children's probability of staying in school when parents' income is low. We also find using *HSB* that daughters of homeowners have a 2 percentage point lower probability of having children as teenagers than daughters of renters at the mean value of parents' income and a 4 percentage point lower probability of having children as teenagers when parents' income is low. Using the *BYS*, the results are even stronger: children of homeowners have a 6 percentage point lower probability of having children as teenagers than children of renters at the mean value of parents' income. We tested for the possibility of selection bias, since homeownership by parents may be acting as a proxy for other characteristics that cause some parents both to buy homes and to bring up more successful children. Using an endogenous switching model which explains both parents' tenure choice and children's stay-in-school decision, we did not find evidence of selection bias.

Overall, the evidence suggests that homeownership matters and it thus provides some justification for government policies that favor homeownership. However, it also suggests that current U.S. tax policy toward homeownership—with its heavy emphasis on deducting mortgage interest and property taxes—is misguided, both because the policy encourages over-consumption of housing by homeowners and because it mainly benefits higher income households who would own homes regardless. Our evidence suggests that housing policy ought to focus instead on providing closed-ended subsidies that would encourage households to become homeowners without encouraging over-consumption of housing at the margin. Further, it ought to focus on lower income households, who otherwise would be unlikely to buy homes.<sup>20</sup>

We can use these results to begin quantifying the benefit of government policies to encourage homeownership by low income households. Suppose that youths who are still in school at age 17 or 18 will graduate from high school; while youths who have dropped out of school by age 17 or 18 will not. Since children of homeowners are more likely to graduate from high school than children of renters and high school graduates earn more, children of homeowners have higher expected future incomes than children of renters. The analysis above gives us various figures for the difference between the probability of children of low

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<sup>20</sup> Gyourko and Linneman (1994) document that homeownership rates have been falling since 1970 for low income households.

income homeowners versus low income renters staying in school. Suppose the differential is 15 percentage points, which is a simple average of the differentials given in table 2 for households whose income is \$10,000 in the *PSID* and the *PUMS*, missing in *HSB*, and equal to the mean in the *BYS*. Now consider the difference in lifetime earnings for high school graduates versus high school dropouts. To estimate this, we ran a regression explaining the earnings of household heads as a function of age, age interacted with whether the head graduated from high school, and other variables. We used data from the 1980 *PUMS*. Using the results of the regression, we calculated the difference between the present value of lifetime earnings of high school graduates versus high school dropouts, as of age 18. Future earnings were discounted assuming a 2% real interest rate and each year of future earnings was also adjusted for the probability of an 18 year old surviving to that age. The resulting lifetime earnings differential for high school graduates versus high school dropouts is \$191,000 in 1980 dollars, or \$326,000 in 1992 dollars. (See the appendix and table A1.) Using these figures, the expected benefit per child of government policies which would enable low income renter households to become homeowners is  $(\$326,000)(.15) = \$49,000$ . The benefit per household would be even higher for low income households that have more than one child and the calculations also ignore other benefits that accrue to children of homeowners, such as the reduced probability of children of homeowners becoming parents as teenagers.

Our results thus provide support for such proposed government policies as giving first time homebuyers a one time tax credit of \$5,000 if their income is below some ceiling or giving reduced rate mortgages to low income home buyers. But they do not provide support for the current policy of giving open-ended tax subsidies to all homeowners regardless of income.

## Appendix

In the regression reported in table A1, the dependent variable is earnings of household heads in the 1980 *PUMS*. The variables *A15-19* through *A80-84* are age dummies, with *A15-19* indicating 15 through 19 year olds, etc. *G* is a dummy variable which equals one if the person graduated from high school and zero otherwise. The variables *G15-19* through *G80-84* are the age dummies interacted with whether the person graduated from high school. *Black* equals one if the person is black, *Female* equals one if the person is female, and *Married* equals one if the person is married. Finally, four dummy variables for size of city are included to capture differences in the cost of living. The omitted category is a rural area.

Using the results of the regression, we calculate the present value of the difference, as of age 18, between earnings for high school graduates versus non-high school graduates. The earnings difference equals the sum of the estimated value of *G*, \$2,646, plus the estimated values of the relevant earnings differentials for each year of age from 15 through 84. Each year's earnings differential is discounted to its value at age 18 using a real interest rate of 2% and earnings differentials beyond age 18 are also discounted by the expected probability of an 18 year old surviving to that age (see U.S. National Center for Health Statistics, 1986). The resulting figure for the present value of the difference, as of age 18, between the earnings of high school graduates versus non-high school graduates is \$191,000 in 1980 dollars. Correcting for inflation using the Consumer Price Index, this is equivalent to \$224,000 in 1982 dollars or to \$326,000 in 1992 dollars.



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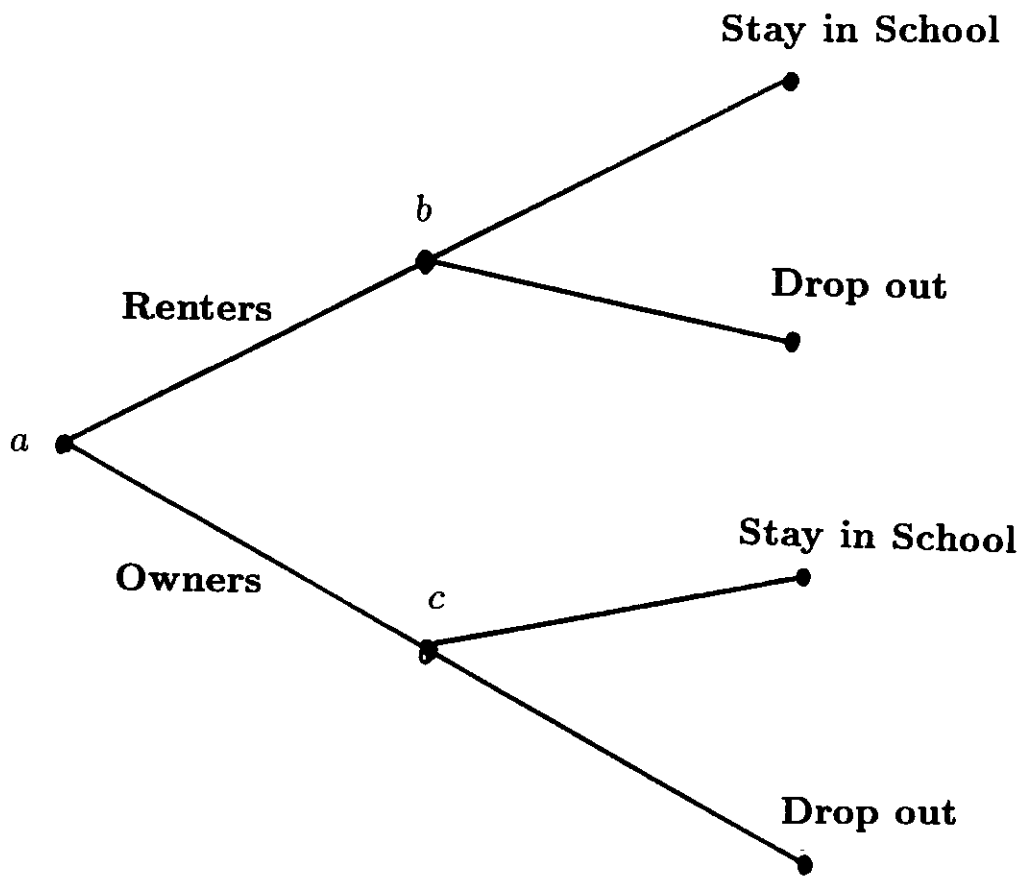
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**Figure 1**

Table 1  
Results of Probit Regressions Explaining the Stay in School Decision  
PSID

	Full Sample	Homeowners	Renters	Means (full sample)
	(1)	(2)	(3)	(4)
Homeowner	.44 (.09)	--	--	.63 (.48)
Black	-.35 (.09)	-.34 (.13)	-.43 (.14)	.51 (.50)
Female Child	-.10 (.08)	-.07 (.11)	-.15 (.12)	.54 (.50)
Family Income	.01 (.003)	.006 (.003)	.03 (.007)	27.1 (24.3)
Parent HS Grad	.33 (.10)	.35 (.14)	.35 (.15)	.29 (.45)
Parent Attends College	.25 (.13)	.17 (.17)	.31 (.22)	.15 (.36)
Parent College Grad	.33 (.18)	.36 (.21)	.40 (.36)	.11 (.31)
Female Head	.03 (.11)	.05 (.17)	-.19 (.14)	.29 (.45)
Divorced Parent	.12 (.13)	-.24 (.20)	.32 (.18)	.12 (.32)
Family Size	.03 (.02)	-.02 (.03)	.05 (.03)	4.61 (1.76)
Parent Worked in Last Yr.	.15 (.09)	.17 (.12)	.09 (.13)	.70 (.43)
Intercept	.57 (.17)	1.34 (.21)	.32 (.24)	--
N	2074	1360	714	2074
pseudo-R <sup>2</sup>	.083	.035	.097	--
Dep. var. mean	--	--	--	.89 (.31)

Table 2:  
 Predicted Probabilities of Children of Owners versus Renters  
 Staying in School

	Model 1			Model 2		
	Children of Owners	Children of Renters	Diff.	Children of Owners	Children of Renters	Diff.
<b>PSID</b>						
Income:						
\$10,000	.90	.81	.09	.91	.78	.13
\$20,000	.92	.83	.09	.92	.86	.06
\$30,000	.93	.85	.08	.93	.91	.02
\$40,000	.94	.88	.06	.94	.95	-.01
Average	.93	.85	.08	.93	.90	.03
<b>PUMS</b>						
Income:						
\$10,000	.90	.76	.14	.90	.71	.19
\$20,000	.93	.81	.12	.91	.75	.16
\$30,000	.96	.86	.10	.93	.78	.15
\$40,000	.97	.90	.07	.94	.81	.13
Average	.95	.85	.10	.92	.77	.15
<b>HSB</b>						
Income:						
Average	.99	.98	.01	.99	.98	.01
Missing	.87	.80	.07	.92	.65	.27
<b>BYS</b>						
Income:						
Average	.91	.76	.15			

Table 3  
Results of Probit Regressions Explaining the Stay in School Decision  
PUMS (1980)

	Full Sample	Homeowners	Renters	Means (full sample)
	(1)	(2)	(3)	(4)
Homeowner	.61 (.07)	--	--	.76 (.42)
Black	.62 (.10)	.56 (.14)	.62 (.13)	.14 (.35)
Female Child	-.08 (.06)	-.24 (.08)	-.11 (.10)	.50 (.50)
Family Income	.02 (.003)	.01 (.003)	.01 (.005)	26.5 (16.6)
Parent HS Grad	.37 (.07)	.34 (.11)	.54 (.12)	.35 (.48)
Parent Attended College	.32 (.10)	.27 (.13)	.54 (.17)	.17 (.38)
Parent College Grad	.78 (.15)	.67 (.17)	1.24 (.35)	.17 (.38)
Female Head	.01 (.11)	-.41 (.19)	.34 (.15)	.22 (.41)
Single Parent	-.18 (.11)	-.12 (.19)	-.16 (.15)	.23 (.41)
Family Size	-.04 (.02)	-.10 (.02)	.03 (.03)	4.70 (1.66)
Housing Quality	.00007 (.00002)	.00007 (.00002)	.00008 (.00004)	3985 (2231)
Length of tenure	-.002 (.002)	-.001 (.002)	-.002 (.004)	9.79 (16.9)
Intercept	.10 (.13)	1.25 (.18)	-.53 (.19)	--
N	3234	2452	782	3234
pseudo R <sup>2</sup>	.168	.114	.104	--
Dep. var. mean	--	--	--	.83 (.38)

Table 4  
Results of Probit Regressions Explaining the Stay in School Decision  
HSB

	Full Sample	Homeowners	Renters	Means (Full Sample)
	(1)	(2)	(3)	(4)
Homeowner	.30 (.05)	--	--	.81 (.39)
Black	.22 (.07)	.23 (.09)	.17 (.10)	.13 (.34)
Female Child	.08 (.04)	.12 (.05)	-.01 (.08)	.56 (.49)
Income = 8-15000	.06 (.11)	-.08 (.13)	.39 (.18)	.12 (.32)
Income= 15-20000	.23 (.12)	.30 (.17)	.18 (.19)	.10 (.30)
Income= 20-25000	.02 (.11)	.07 (.15)	-.02 (.19)	.11 (.31)
Income = 25-30000	.08 (.12)	.10 (.15)	.04 (.22)	.11 (.31)
Income = 30-40000	.13 (.12)	.17 (.15)	.03 (.24)	.13 (.34)
Income > 40000	.20 (.17)	.10 (.18)	.51 (15951)	.07 (.26)
Income missing	-1.51 (.08)	-1.53 (.10)	-1.44 (.12)	.21 (.40)
Parent HS Grad	.32 (.10)	.26 (.11)	.51 (.22)	.05 (.22)
Parent Attended College	.36 (.05)	.38 (.06)	.33 (.09)	.39 (.49)
Parent College Grad	.38 (.08)	.40 (.09)	.25 (.16)	.15 (.36)
Female Head	.16 (.07)	.14 (.09)	.15 (.12)	.20 (.40)
Single Parent	-.40 (.06)	-.45 (.07)	-.27 (.12)	.29 (.45)
Family Speaks English	.17 (.07)	.20 (.09)	.08 (.14)	.90 (.30)
Handicapped Child	-.26 (.04)	-.28 (.05)	-.18 (.08)	.35 (.48)
Academic HS	.67 (.06)	.75 (.08)	.49 (.11)	.39 (.48)
Rural	-.05 (.11)	.10 (.07)	.05 (.10)	.22 (.41)

Table 4 (cont.)  
 Results of Probit Regressions Explaining the Stay in School Decision  
 HSB

Suburban	.01 (.05)	.02 (.06)	.09 (.10)	.52 (.50)
Intercept	1.83 (.09)	1.87 (.12)	1.39 (.16)	--
N	10981	8861	2120	10981
pseudo R <sup>2</sup>	.390	.372	.322	--
Dep. var. mean	--	--	--	.91 (.29)



Table 5  
Results of Probit Regressions Explaining whether Youths have Children  
HSB

	Full Sample	Sons	Daughters	Means (full sample)
	(1)	(2)	(3)	(4)
Homeowner	-.09 (.04)	-.02 (.07)	-.12 (.05)	.81 (.39)
Black	.29 (.05)	.24 (.07)	.34 (.06)	.13 (.34)
Female Child	.44 (.04)	--	--	.56 (.49)
Income = 8-15000	-.06 (.07)	-.02 (.11)	-.06 (.09)	.12 (.32)
Income= 15-20000	-.001 (.07)	.0001 (.11)	.01 (.09)	.10 (.30)
Income= 20-25000	-.05 (.07)	-.13 (.12)	.02 (.10)	.11 (.31)
Income = 25-30000	-.06 (.07)	-.15 (.12)	.02 (.10)	.11 (.31)
Income = 30-40000	-.12 (.08)	-.15 (.11)	-.10 (.10)	.13 (.34)
Income > 40000	-.20 (.10)	-.27 (.15)	-.15 (.13)	.07 (.26)
Income missing	.62 (.06)	.33 (.08)	.84 (.07)	.21 (.40)
Parent HS Grad	-.07 (.08)	.009 (.11)	-.13 (.10)	.05 (.22)
Parent Attended College	-.25 (.04)	-.25 (.06)	-.26 (.05)	.39 (.49)
Parent College Grad	-.32 (.06)	-.17 (.08)	-.45 (.08)	.15 (.36)
Female Head	-.14 (.06)	-.17 (.09)	-.12 (.08)	.20 (.40)
Single Parent	.30 (.05)	.29 (.08)	.32 (.06)	.29 (.45)
Family Speaks English	.02 (.05)	.11 (.08)	-.04 (.07)	.90 (.30)
Handicapped Child	.17 (.04)	.17 (.06)	.17 (.04)	.35 (.48)
Academic HS	-.38 (.04)	-.32 (.06)	-.41 (.05)	.39 (.48)
Rural	-.09 (.04)	.06 (.07)	-.02 (.06)	.22 (.41)

Table 5 (cont.)  
 Results of Probit Regressions Explaining whether Youths have Children  
 HSB

Suburban	-.24 (.04)	-.11 (.06)	-.34 (.05)	.52 (.50)
Intercept	-1.32 (.06)	-1.39 (.10)	-.87 (.08)	--
N	10981	5201	5780	10981
pseudo R <sup>2</sup>	.148	.079	.171	--
Dep. var. mean	--	--	--	.11 (.31)

Table 6:  
 Predicted Probabilities of Children of Owners versus Renters  
 Having a Child and Being Arrested

Probability of Having a Child:

	Both Sexes			Daughters		
	Children of Owners	Children of Renters	Diff.	Children of Owners	Children of Renters	Diff.
<b>HSB</b>						
Income:						
Average	.09	.10	-.01	.11	.13	-.02
Missing	.21	.24	-.03	.30	.34	-.04
<b>BYS</b>						
Income:						
Average	.03	.09	-.06			

Probability of Being Arrested:

<b>BYS</b>			
Income:			
Average	.03	.08	-.05

Table 7: Results of Probit Regressions Explaining  
the Stay in School Decision, Whether Youths have  
Children and Whether Youths get Arrested

N.B.E.R. BYS

	Stay-in- School	Have Child	Arrested	Means (full sample)
	(1)	(2)	(3)	(4)
Homeowner	.67 (.22)	-.61 (.30)	-.54 (.29)	.29 (.45)
Black	.63 (.20)	.50 (.24)	-.63 (.28)	.46 (.50)
Female child	.01 (.18)	.33 (.22)	-.77 (.26)	.41 (.49)
Income \$3,600-7,200	-.08 (.60)	-.44 (.67)	-.41 (.64)	.11 (.32)
Income \$7,200-12,000	.36 (.60)	-.51 (.68)	-1.14 (.65)	.14 (.35)
Income \$12,000-18,000	.24 (.61)	-.90 (.72)	-1.19 (.70)	.15 (.36)
Income \$18,000-24,000	-.05 (.61)	-.57 (.71)	-.56 (.66)	.12 (.33)
Income \$24,000-30,000	.11 (.64)	-.35 (.73)	-.52 (.69)	.08 (.28)
Income > \$30,000	-.36 (.63)	-.67 (.77)	-.57 (.68)	.09 (.29)
Income missing	-.01 (.59)	-.59 (.66)	-.55 (.64)	.27 (.44)
Head's education 12 years	-.27 (.23)	.05 (.30)	.46 (.32)	.50 (.50)
12-16 years	.24 (.39)	.03 (.45)	.37 (.47)	.09 (.29)
> 16 years	-.31 (.27)	.01 (.35)	-.09 (.40)	.22 (.41)
Female head	-.08 (.18)	.20 (.24)	-.26 (.24)	.55 (.50)

Head works	-.06 (.23)	.12 (.29)	-.46 (.28)	.79 (.41)
Crime problem in neigh.	-.23 (.21)	.38 (.32)	.13 (.27)	.78 (.42)
Gang member	-.45 (.39)	.06 (.59)	1.21 (.43)	.04 (.20)
Intercept	.84 (.61)	-1.66 (.89)	-1.41 (.66)	
N	322	322	322	
Pseudo R <sup>2</sup>	.09	.10	.20	
Dep. var. mean	.79 (.41)	.09 (.28)	.10 (.30)	

Table 8  
Results of Bivariate Probit Models

Stay in School Equation				
	$\rho \neq 0$		$\rho = 0$	
	Renter	Homeowner	Renter	Homeowner
Constant	.79 (.25)	1.23 (.46)	.79 (.29)	.98 (0.20)
Black	-.08 (.24)	-.34 (.21)	-.08 (.21)	-.30 (0.17)
Income	.02 (.008)	.008 (.005)	.02 (.007)	.009 (.004)
Ed. = 12 yrs.	-.13 (.25)	.07 (.20)	-.13 (.24)	.06 (.28)
Ed. > 12 yrs & Ed. < 16 yrs.	.35 (.71)	.42 (.53)	.35 (.58)	.41 (.32)
Ed. > 16 yrs.	-.19 (.28)	.21 (.27)	-.19 (.27)	.20 (.27)
Female head	-.38 (.20)	-.12 (.22)	-.38 (.20)	-.16 (.21)

Tenure Choice Equations (1=Homeowner)		
	Renter	Homeowner
Constant	-1.00 (.21)	-1.00 (.21)
Black	.38 (.11)	.38 (.11)
Income	.017 (.004)	.017 (.004)
Family Size	.04 (.03)	.04 (.03)
Married Head	.69 (.12)	.68 (.11)
Weeks Worked in Past Year	.005 (.003)	.005 (.003)
Head's age < 30	-.13 (.16)	-.13 (.16)
Head's age > 29 & < 40	.16 (.17)	.17 (.17)
Head's age > 39 & < 50	.17 (.19)	.17 (.19)
Head's age > 49 & < 60	-.08 (.19)	-.08 (.19)
Correlation Coefficient	-.005 (.33)	-.14 (.44)

Table A1:  
OLS Regression Explaining Earnings of Household Heads

1980 PUMS

	Coefficient	S.E.
A15-19	-901	523
A20-24	407	632
A25-29	2,135	629
A30-34	3,096	621
A35-39	4,261	604
A40-44	4,410	598
A45-49	4,813	589
A50-54	5,184	571
A55-59	3,602	569
A60-64	2,336	565
A65-69	485	563
A70-74	-76	565
A75-79	496	585
A80-84	385	636
G	2,646	877
G15-19	-1,567	1,126
G20-24	-27	962
G25-29	1,413	957
G30-34	3,607	952
G35-39	5,201	944
G40-44	5,884	943
G45-49	6,415	940
G50-54	5,527	929
G55-59	5,161	929
G60-64	4,097	932
G65-69	2,769	938
G70-74	2,526	953
G75-79	1,469	994
G80-84	181	1,077
Black	-3,693	139
Female	-5,348	125
Married	-2,495	117
Large city	1,588	136
Small city	3,496	127
Large town	1,305	142
Small town	434	170
Intercept	9,075	523
R2	.28	
N	65,700	