

# The ABC of housing strategies. Are housing assistance programs effective to enhance children's well being?\*

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## Abstract

This paper examines the effect on school enrollment, child labor and poverty reduction of a ABC strategy (savings-voucher-credit) that provides assistance to poor families in Ecuador to have an own and adequate house. Administrative data is merged to a household panel to link the history of a voucher's application with socioeconomic information before and after the intervention. To identify an effect two empirical approaches are employed. First, I exploit the variation on time of the different stages involved in obtaining the voucher and converting it into a house to construct comparable treatment and control groups using a sample of approved applicants. Second, I use the variation across siblings within families that arises from the fact that siblings get the program at different ages. By comparing the two approaches I find that the program has a positive effect on enrollment for children that are in the transition age from compulsory to non compulsory school. Moreover, it decreases the probability of a child to participate in the labor market, and has a positive impact on reducing the likelihood to live in poverty. Mediating factors that can partially explain the results are the increased access to sanitation, better quality of materials of the house and a reduced probability to live overcrowded.

JEL-codes: H53, I28, I38, R21

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# 1 Introduction

The provision of houses and the improvement of housing quality is a common concern for societies in developed and developing countries. This conception is fueled by a widely held belief that housing is an important component of a basic package that is deemed to be necessary to have a good standard of living. From that perspective adequate housing is considered to be a basic human right and an end on itself. Nevertheless, there are 1.6 billion people worldwide that live in substandard housing, according to United Nations, in a situation that threatens their lives, health and prospects of development (UN-HABITAT, 2011).

Adequate housing has also been recognized as an effective mean to alleviate poverty and, therefore, has an important role in strategies of poverty reduction in the developing world<sup>1</sup>. Its effectiveness is based on the realization that shelter is usually the most expensive item for households and also that housing is a source of income as it may be used as a mean to build wealth, promote equity access and involvement in productive activities. It is argued even further that housing might generate social benefits by building human capital of individuals, factor that is considered to be a key element to overcome the vicious circle of poverty (Green and White, 1997; Currie and Yelowitz, 2000). For these reasons, most governments have allocated substantial resources on housing assistance programs with the intention to provide adequate housing for poor groups in the population. In developing countries, governments invest every year between 15% and 35% of their total investment in social policies on these type of programs (IADB, 2007).

Despite the importance of housing as a factor influencing well-being, the effects of housing assistance programs have been seriously understudied. Moreover, most of the evidence that can be found in the literature apply to the context of developed countries whose vision on housing assistance differs greatly from that of developing countries (Currie and Yelowitz, 2000; Jacob, 2004; Sanbonmatsu et al., 2006; Fertig and Reingold, 2007). Housing assistance to poor families in developed countries consist mainly in providing them financial assistance to afford the payment of their rent either in one of the housing units of the Public Housing projects or in the private rental market through the provision of vouchers. In contrast, housing assistance programs in developing countries aim to provide financial assistance targeted to poor families to either obtain an own an adequate house or to improve the quality of an existing owned dwelling. The most popular program of this type provides a single voucher that can be used to support part of the housing investment which is complemented by family's savings and a mortgage loan. The latter is known as a savings-voucher-mortgage scheme or "ABC" for the Spanish words:

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<sup>1</sup>As example, refer to UN-HABITAT, 2010 for the strategy of poverty reduction in Ghana and Bunnarith, 2004 for the poverty reduction strategy in Cambodia).

Ahorro (savings), Bono (voucher), and Crédito (mortgage loan).

This paper has the purpose to fill the gap in the development literature by investigating the effect of housing assistance programs in promoting the well being of poor families and, potentially, poverty alleviation in developing countries. Specifically, I examine the impact of a greatly promoted ABC housing assistance program in Ecuador on school enrollment, child labor and its likelihood to take a family out of poverty. An additional contribution of this paper is to go beyond the estimation of the impact of the program, by examining the potential mechanisms through which the effect might work.

In order to estimate an effect I combine administrative data from the ABC program to a household panel data (SELBEN panel data) that is used to target social benefits in Ecuador. This allows me to link the history of a voucher, from its moment of application to the moment when a family succeeds in converting the voucher into a house, with socioeconomic information of the household and their children both before and after the intervention. The empirical analysis applies two strategies in an attempt to identify a causal effect of the program. First, I exploit the variation on time on the different stages involved in obtaining the voucher and converting it into a new house to construct comparable treatment and control groups. I do this in a fixed effects setting using a sample of approved applicants to the program. Second, I use the variation across siblings within families that arises from the fact that siblings get the program at different ages. The comparison of the results between these different strategies are used to provide an indication of the causality of the program on children outcomes.

I find that the program significantly increases the probability of enrollment for children aged 15 to 17. The latter is specially relevant for public policy as represents the transition age from compulsory to non compulsory school where most of students drop out from the educational system. In parallel with the increment on school enrollment, the program decreases the probability of a child to participate in the labor market at the same age interval which may be interpret as an indication of the substitutability between education and labor at this age. Furthermore, I find that this type of housing assistance has a positive impact on reducing the likelihood of a child to live in a house considered poor. This give a serious indication of the potential of housing programs as a tool in a strategy of poverty reduction. Finally, the results show that possible mediating factors that can partially explain the results are the increased access to sanitation, better quality of material of the house and a reduced probability to live in an overcrowded condition.

The remainder of the paper is organized as follows. The next section provides a brief overview of the theoretical links between housing assistance programs and children outcomes, and presents the main findings available in the economic literature. Section 3 describes the context of housing investment in Ecuador and provides further details of the

housing assistance program used in the analysis. Section 4 outlines the data used for the analysis. Section 5 describes the two empirical approaches used to identify the effects of the program and their assumptions. Section 6 presents the results and the potential mechanisms that may explain the estimated effects. Section 7 summarizes and concludes.

## **2 Existing Literature**

### *Theoretical Links*

Housing assistance is expected to have an effect on child outcomes through different mechanisms. First, housing assistance may provide a better physical environment to families than the one experienced in the absence of the program. A better environment includes greater access to clean water, basic sanitation or garbage disposal, improved materials of floors and roofs and a lesser likelihood of a house to be overcrowded. All of these might be considered as inputs on a health production function which is itself related to educational achievement (Becker, 1964; Grossman, 1999). There are a number of studies that document the association between overcrowding and children's poor health (Mann et al., 1992; Coggon et al., 1993), and also the negative effects of living in a overcrowded home on children's performance at school (Goux and Maurin, 2005). In a recent paper, Cattaneo et al. (2009) also suggest that there is a positive effect of upgrading dirt floors to cement floors in improving the health status and the cognitive development of children.

Second, the relocation of families into new locations induced by programs of housing assistance may provide families the opportunity to move to better neighborhoods. Neighborhood quality may have positive effects on children's educational outcomes by increasing the exposure of children to more advantage peers or better role models (Jencks and Mayer, 1990; Brooks-Gunn et al., 1997). In addition, it may also have positive effects by increasing the access to better social networks or local public goods such as schools and libraries (Ellen and Turner, 1997; Hoxby, 2000).

A third mechanism by which housing assistance may affect children educational outcomes is through residential stability. Given the transaction costs of moving, families that become homeowners are also more likely to be stable in the long run (Aaronson, 2000). If the stability created by homeownership leads to more social capital in the form of more attachment to the school system, teachers and peers, it can be considered a fair mechanism that may mediate this relationship. There is in the literature substantial evidence that documents the negative association of family and school mobility on student achievement (Astone and McLanahan, 1994; Kerbow, 1996; Hanushek et al., 1999).

Fourth, housing assistance may have an impact on the behavior or attitudes of their parents towards their children. Several studies have documented the effects of improved

housing on the level of self stem, happiness, anxiety, depression and other kind of psychological distress. Rossi and Weber (1996) found that better housing increases household's life satisfaction and happiness. Elton and Packer (1996) showed that improved housing quality reduces anxiety and depression among adults. Given these pathways, parents are more likely to create an adequate home environment for their children which is considered to be a key determinant of the educational attainment of a child (Rosero and Oosterbeek, 2011; Paxson and Schady, 2007).

### *Previous Findings*

The empirical evidence about the effects of housing assistance programs on children outcomes is thin for developed and developing countries (Almond and Currie, 2010). In developed countries this kind of analysis has been motivated by the public discontent on Housing Projects as a policy of housing assistance, and the shift to vouchers to be used by poor families as a mean of payment for renting a house. In contrast, the evidence in developing countries is motivated by the need of governments to evaluate voucher programs that promote the access of poor families to a new and adequate house, or that improve the physical condition of an existing house.

Currie and Yelowitz (2000) explore the effects of living in Public Housing projects in the United States on house quality and educational attainment. To address the endogeneity of program receipt, they follow a two sample instrumental approach where the probability of living in a project is instrumented by the sex composition of siblings on families with two children. They find that families are less likely to be overcrowded and that children in the program are also less likely to be held back in school.

Jacob (2004) compares the effects of living in a Public Housing buildings versus a program of vouchers that promotes families to move to private housing in the Chicago metropolitan area. For identification, Jacob makes use of a series of high rise building demolitions as an instrument to compare children in families that were transferred to another buildings and families that were offer the voucher. The results suggest that, compared to vouchers, Public Housing participation has no significant effects on student achievement.

Using an experimental design, Sanbonmatsu et al. (2006) explores the benefits of a voucher-based assistance on educational outcomes in five major cities of the United States. The analysis make use of the Moving to Opportunity program (MTO) that randomly assigned families that voluntarily wanted to be reallocated away from Public Housing to three different groups: (i) a treatment group in which families received a voucher to be used to rent a house in low poverty areas and also received external assistance to find a new place, (ii) a treatment group that received a voucher without any requirements of location and assistance, and (iii) a control group that did not received a voucher or any

assistance. Compared to the control group, they find no significant effect on test scores or behavior of the children on neither of the treatment groups despite the fact that children lived on average in better neighborhoods.

Fertig and Reingold (2007) examines the effect of moving into a Public Housing on children's health outcomes. Using data from the Fragile Families Study in the United States, they compare families living in Public Housing buildings with families that are eligible for the program. To control for endogeneity for Public Housing participation the the analysis uses 3 instruments: Gender composition of siblings, variation of Public housing supply in each location, and the variation across cities in the length of waiting lists in each location. The results show that there is no significant effect of Public Housing on child health status or the likelihood of a child to be malnourished.

In an attempt to evaluate ABC voucher programs in Latin America, the Interamerican Development Bank promoted a series of impact evaluation studies analyzing the cases of Chile, Colombia, Panamá, Costa Rica and Ecuador (Marcano and Ruprah, 2008; Pecha, 2011; Pecha, 2010; Nadin and Almanza, 2010; Marcano, 2010). All these studies used longitudinal data coming from household surveys and applied a matching propensity score methodology to try to control for the selection bias of program's participation. The results presented by these studies are not homogeneous. While there is significant positive effect of receiving the voucher on school attendance for children between 6 and 14 years old in Colombia and for girls between 10 and 14 years old in Costa Rica, there is no effect of the program for the cases of Chile, Ecuador and Panamá. These studies suffer from three important limitations. First they use extremely small samples as the household surveys identify a small number of beneficiaries of the program. Second, the treated observations correspond to families that have received the voucher but it is not known if the families where able to convert it into a new house. Third, the identification strategy used in these studies do not take into consideration the possible endogeneity of the unobservable variables that reflect the choice to apply to the program and might be also correlated with children outcomes. In this regard, the analysis presented in this paper overcomes these limitations as it uses administrative data with large sample of applicants, that can identify families on different stages of the program and exploits a more plausible source of exogenous variation.

### **3 Context and intervention**

#### *Context*

Ecuador is a lower middle income country with a population of 13 million inhabitants living in 3.3 million housing units. The country is characterized by a large share of its

population living in poverty and by an unequal distribution of income. Poverty in 2006 affected around 38 percent of the Ecuadorian population which live below the consumption poverty line. The Ecuadorian educational system is conceived as a mechanism to enable poor families to escape from poverty. It is divided in two regimes: compulsory and non compulsory. The compulsory regime which is often called “Basic schooling” starts at the age of 5 years old and ends at the age of 14. The non compulsory schooling, called “Medium schooling”, comprises three additional years starting at the age of 15 and ending at the age of 17 years old and is considered to be a prerequisite for higher education. Enrollment in basic schooling is almost universal (around 93%), but drops sharply at the transition age from basic to medium education (less than 55%). In line with educational statistics, child labor rises sharply in this transition age from 18% at the age of 14 years old to 30% at the age of 15. As expected, the drop in enrollment and the rise in child labor is more pronounced for children in poor families.

As in most countries in Latin America, housing policy in Ecuador is considered to be a key element of a basic package that is deemed to be necessary to enjoy a good standard of living. Despite this fact, four out of ten households do not own a house and 27% of the homeowners declare to do not have legal tenure of the house. Ecuador’s quantitative housing deficit in 2009 was estimated at 717,239 units needed to give accommodation to homeless people and also replace units which are considered to be insufficient (located in areas not suitable for residential purpose or built using non durable materials). Around 64% of this deficit is concentrated in families that belong to the poorest 40 percent of the country and every year the demand for housing increases by 54 thousand units (MIDUVI, 2010). In addition to the quantitative gap, there is qualitative shortage of adequate housing reflected in 52% of the households that lack access to safe drinking water, 50% that have no access to adequate sanitation and 26% of the households that are considered to be overcrowded.<sup>2</sup>

A small formal unsubsidized mortgage market exists in Ecuador to finance investments in housing. While this market serves the demand of middle and high income families, low income families typically lack the collateral needed to have access to credit.<sup>3</sup> This borrowing constraint prevents low income families from buying commercially built houses. The latter combined to a rental market that is segmented and functions poorly, results on most of the housing investment of low income families to occur progressively over a long period of time (Frank, 2004; Ferguson and Navarrete, 2003).<sup>4</sup> Typically a household acquires land through different means specially by squatting private or public

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<sup>2</sup>A household is considered to be overcrowded if three or more people sleep in the same single bedroom

<sup>3</sup>A typical house that can be acquired in this market in 2009 is estimated to have a market value of US\$40.000. In contrast, a house for a low income family is valued in a range of US\$8.000 to US\$12.000

<sup>4</sup>While 9.3% of families in the poorest quintile rent a house, 21% in the richest quintile do so.

property or by the division of parent's land. After building a temporary dwelling to secure the land, families start a gradual process in which families improve the structure of the house, work in the legal tenure of the house and even lobby for basic services. The result of the progressive housing process is that poor families, for an important part of their lives, live in unsanitary and disrupted environments that lack from basic amenities (Ferguson and Navarrete, 2003).

The government's approach to housing subsidies has been traditionally supply-sided through public institutions that used to concentrate all the processes of providing a new house for low income people. The processes included land acquisition, house construction, the development of a loan and saving system and the qualification of families for loans at subsidized mortgage rates. From 1998 onwards, the Ecuadorian government implemented a shift on its policy of housing subsidies adopting a demand-side approach based on vouchers<sup>5</sup> which provided families with the opportunity to rely on markets to increase their ability to consume housing of a particular type at the lowest cost to the government (Buckley and Kalarickal, 2006).

#### *Description of the program*

To shift to a demand based approach, the Ecuadorian government created a new nationwide program in 1998 called Housing Incentive System (SIV).<sup>6</sup> The main objective of the program is to improve the living conditions of poor families by giving them financial support to either buy a new and adequate house or to improve the quality of their current house. With this program, the government aims to reduce the country's housing shortage.

The program benefit consist on a subsidy given to families through a voucher that is complemented by the beneficiary's own savings and a mortgage loan. The design is known as an ABC scheme based on the Spanish words for savings-voucher-mortgage. The program has two components: the first promotes new housing and the second supports housing improvement. This paper focuses on the effects of the first component mainly due to the absence of trustworthy administrative data from the second component. Moreover, around 85% of the vouchers issued by the program are given for a new house's purchase.

Within the new housing component, applicants to the program can apply to buy a house unit with a maximum value of US\$20,000. Applicants need to prove that at least 10% of the total value of the house is held in a savings account. The amount of the voucher is US\$5,000 which is 10 times the value of a monthly basic consumption bundle.

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<sup>5</sup>A similar approach was adopted in most of Latin American Countries among them Chile, Colombia, Costa Rica, Dominican Republic, Nicaragua and Panama.

<sup>6</sup>The program is also called in Spanish "Bono de Vivienda"



The difference between the estimated cost of the house and the amount of the voucher plus savings can be borrowed as a mortgage loan provided by any financial institution registered with the program at the market interest rate. The program is managed and operated by the Ministry of Housing.

To be eligible for the program, none of the members of the applicant family should own a dwelling in the country.<sup>7</sup> Additionally, the family's monthly income should not exceed US\$654 and the family should be ranked among the 60% poorest households in the database of SELBEN which is used in Ecuador to target social benefits<sup>8</sup>.

Between 1999 and 2006, around 53,000 vouchers for a new house were issued. From 2007 to 2009 the program became more active and around 103,000 vouchers for new housing were awarded and paid out. During this last period the program invested US\$521 million which represents 0.8% of GDP and 20% of the total investment of the government in the social sector.

### *Procedure*

The procedure to obtain a voucher and a new house entails some steps and involves several actors. Figure 1 summarizes the process. The first step is the application where a number of documents have to be presented at the regional offices of the Ministry of Housing. These documents include certificates stating the applicant's income and savings and a proof that none of the family members own a house issued by the land-registration office. Families can apply at any time of the year.

As the second step, local personnel of the Ministry of Housing evaluates the documents submitted by the applicants. This entails to verify the validity of the documents and compare the application with information in the SELBEN data base. The validation of the applications is made in the order of their submission on a first come, first served basis. As a result of this procedure an application is accepted or rejected.

The third step is the voucher's emission which is made at the local offices of the program in each province based on the result of the evaluation of an application as long as the annual budget of the program has not run out. As a result, a single-page document signed by the local authority of the Ministry of Housing is handed over to each accepted family. The subsidy is never paid in cash to the family.

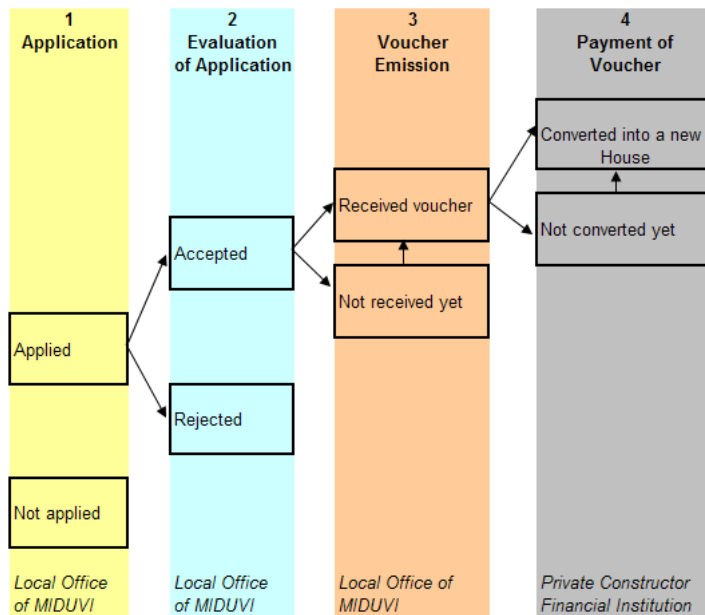
The last step is the actual payment of the voucher which requires that the family

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<sup>7</sup>According to the program, a family is composed by: head, spouse and children under 18 years old.

<sup>8</sup>SELBEN, is a census type data base that has information about household and family's socio-economic characteristics of 2.5 million households (78% of the Ecuadorian households) from geographical zones previously targeted by a poverty map. With this information, an index of socioeconomic status is computed and, according to this index, the households are ranked by their relative position. This data set is also used to target programs such as the government's cash transfer program and several nutritional programs.

**Figure 1.** Procedure of the ABC housing assistance program



found a suitable dwelling and, in most cases, applied and received a mortgage loan. To find a house, beneficiaries get in contact with one of the the privately funded construction projects that have been registered in the program’s offices and that offer houses with a value of at most US\$20.000. Once agreed on the purchase, families transfer the voucher to the private constructor as mean of payment. In parallel, beneficiaries may apply for a mortgage, using the house as a collateral, with one of the financial institutions that are registered in the program.

Just at the moment that the voucher is claimed by the constructor an expense is accounted by the program and a new house is effectively granted to the beneficiary. Therefore, in the analysis, the payment of the voucher is considered to be the true indicator that a family possesses a house. A typical house provided by the constructor will be around 56 square meters, with at least two bedrooms, built with adequate and resistant materials, and must have proper connection to the public networks of water and sanitation. According to the program, the average time between application and receipt of a house is between 7 and 8 months. The average time between obtaining the voucher and being able to convert it into a new house is between 5 and 6 months.

## 4 Data and main outcome variables

### *Data*

To estimate the effect of the housing program on school enrollment and child labor I combine two data sets. The first data set comes from the administrative records of the program

provided by the Ministry of Housing. The data set contains the approved applications for the new house component of the program from April 2007 to October 2009 in urban areas. A family is identified in this data set by the national identification number (ID number) of the applicant. The database contains complete information on the progress of the application until the moment when the voucher is paid out. The data include the date of the voucher's approval, the date on which the voucher is issued and the date at which the voucher is paid out and converted into a house. Nevertheless, it does not include information about the exact date of application. The administrative data set has 26,288 approved applications for a new house where 60% of the cases applied and converted the bonus before December 2008.

The second source of information is the panel data of the first and second round of SELBEN. The panel data has census-type socioeconomic information of 1.5 million households and includes data on infrastructure of the dwelling, household composition and personal characteristics of the household members such as gender, age, civil and labor status and educational achievements. The first wave was taken from 2001 to 2006, the second wave was collected in 2008 and 2009. 80% of the observations in the first wave were surveyed in the period 2001-2003 and 93% of the households in the second wave were surveyed in 2008.

I merge the administrative records with the SELBEN panel using the national identification number. In this way I am able to link the history of a family's voucher application with socioeconomic information of the household, household composition and characteristics of the children of these families before and after the intervention. While the identification strategy will be explained in the next section, the combination of data sets give me an opportunity to determine whether a child, at the moment of the second SELBEN survey, was living in a family that applied to the program, was approved and was able to convert it into a house (treated children) or whether a child was living in a family that applied to the program, was approved and had not been able yet to convert it (control children).

One limitation of the SELBEN data is that, at the moment of the survey, the enumerators were instructed to obtain at least one ID of an adult per household, mainly the ID of the spouse who is likely to be around the house more often than the partner/husband. Given this limitation, the merging exercise was successful for 7,749 households from the administrative records to the SELBEN panel by the ID of some of its adult members. The sample used in the analysis is a subsample of this data set. First, the sample was restricted to households that had at least one child between 6 years old and 18 years old in the first SELBEN survey. The latter cuts the sample to 4,106 households with 6,537 children. Second, to capture the effects of the program, the definition of treatment was restricted to

households and children that have converted the bonus at least 180 days before the second survey of SELBEN which is considered by the program administrators the minimum amount of time to expect any short run effect on school enrollment and child labor. This reduces the sample to 4,737 children in 2,986 households. Finally, as I analyze the impact of the program on school enrollment and child labor, I consider children not older than 18 years at the moment of the second SELBEN survey. The final sample consists of 3,369 children in 2,104 households. The children in this sample were born between 1986 and 2002 and the main characteristics of them and their families prior to the intervention are presented in Table 1.

### *Outcome variables*

The main outcomes in the analysis are school enrollment and child labor. The analysis uses two definitions of school enrollment. The first one is enrollment of child  $i$  at the moment of the first or second SELBEN survey which takes advantage of the availability in the SELBEN questionnaire of the following question: “Are you enrolled in the present schooling year?”. The second definition is enrollment of a child  $i$  at age  $a$  which combines the question described above, and the following question: “Which is the highest level and grade of education that you have achieved?”. The latter allows me to infer whether or not the child was enrolled at a certain age. For example, if a child is older than 16 in the second SELBEN survey and is currently enrolled, the child is assumed to also have been enrolled at age 16. In the same way, if a child older than 16 in the second SELBEN survey is not currently enrolled but the highest level achieved by the child is higher or equal to the level that he should have had at age 16, then it is inferred that the child was enrolled at age 16.

Child labor is defined as participation in the labor market. It includes not only having a job but also searching actively for a job in the week prior to the interview. In both SELBEN surveys, this question is answered by all individuals older than five years.

As an additional outcome, I am interested to analyze the effect of the program on the likelihood of a child living in a family considered poor or extreme poor. While the SELBEN survey does not include questions that measures the income or the consumption of a person or the household, the questionnaire includes questions that can be combined to construct a poverty index using the basic needs approach to measure absolute poverty. The basic needs approach attempts to define a minimum set of needs that have to be satisfied for long term well being ((Sen, 1999)). The definition of these minimum set follows the one that is used by statistical authorities in Ecuador (Vos, 1998). A household is defined as “poor” if it meets at least one of the following criteria: (i) an inadequate physical condition of the dwelling defined by the material of its floor, (ii) an inadequate

**Table 1.** Differences by treatment status

| Variable           | Controls<br>(1) | Treated<br>(2)   | p-value<br>(3) |
|--------------------|-----------------|------------------|----------------|
| <i>Outcomes</i>    |                 |                  |                |
| Enrollment         | 0.964<br>(0.00) | 0.962<br>(0.01)  | [0.775]        |
| Child labor        | 0.004<br>(0.00) | 0.006<br>(0.00)  | [0.318]        |
| Access sanitation  | 0.368<br>(0.01) | 0.413<br>(0.02)  | [0.083]        |
| Access floor       | 0.848<br>(0.01) | 0.852<br>(0.01)  | [0.858]        |
| Access shower      | 0.139<br>(0.01) | 0.148<br>(0.01)  | [0.627]        |
| Overcrowding       | 0.565<br>(0.01) | 0.548<br>(0.02)  | [0.483]        |
| <i>Controls</i>    |                 |                  |                |
| Gender             | 1.484<br>(0.01) | 1.487<br>(0.02)  | [0.862]        |
| Age                | 8.744<br>(0.04) | 8.901<br>(0.06)  | [0.024]        |
| SELBEN             | 44.01<br>(0.15) | 44.481<br>(0.20) | [0.197]        |
| Household size     | 5.037<br>(0.04) | 5.057<br>(0.05)  | [0.832]        |
| Number of adults   | 1.989<br>(0.02) | 2.019<br>(0.03)  | [0.439]        |
| Number of children | 3.048<br>(0.03) | 3.038<br>(0.04)  | [0.891]        |
| School mother      | 6.944<br>(0.08) | 7.496<br>(0.11)  | [0.003]        |
| School head        | 6.775<br>(0.08) | 7.118<br>(0.11)  | [0.056]        |
| Age mother         | 34.84<br>(0.17) | 34.762<br>(0.23) | [0.826]        |
| Ethnicity head     | 0.011<br>(0.00) | 0.02<br>(0.00)   | [0.185]        |
| Activity head      | 0.898<br>(0.01) | 0.896<br>(0.01)  | [0.896]        |
| Income head        | 0.975<br>(0.00) | 0.973<br>(0.01)  | [0.761]        |
| Disabled head      | 0.009<br>(0.00) | 0.012<br>(0.00)  | [0.528]        |
| N                  | 2237            | 1132             |                |

*Note:* Mean values and standard deviation in parenthesis. P values, in brackets, are based on t-test for equality of means.

provision of basic services such as lack of access to sanitation and safe water, (iii) high level of economic dependence, defined by households in which there are more than three unemployed members per employed person and in which the household head has at most two years in primary school, (iv) no enrollment in school of at least one child between 6 and 12 years old, (v) Overcrowding defined as more than 3 persons per bedroom. A household is defined as “extremely poor” if it meets at least two of these conditions.

## **5 Empirical approach**

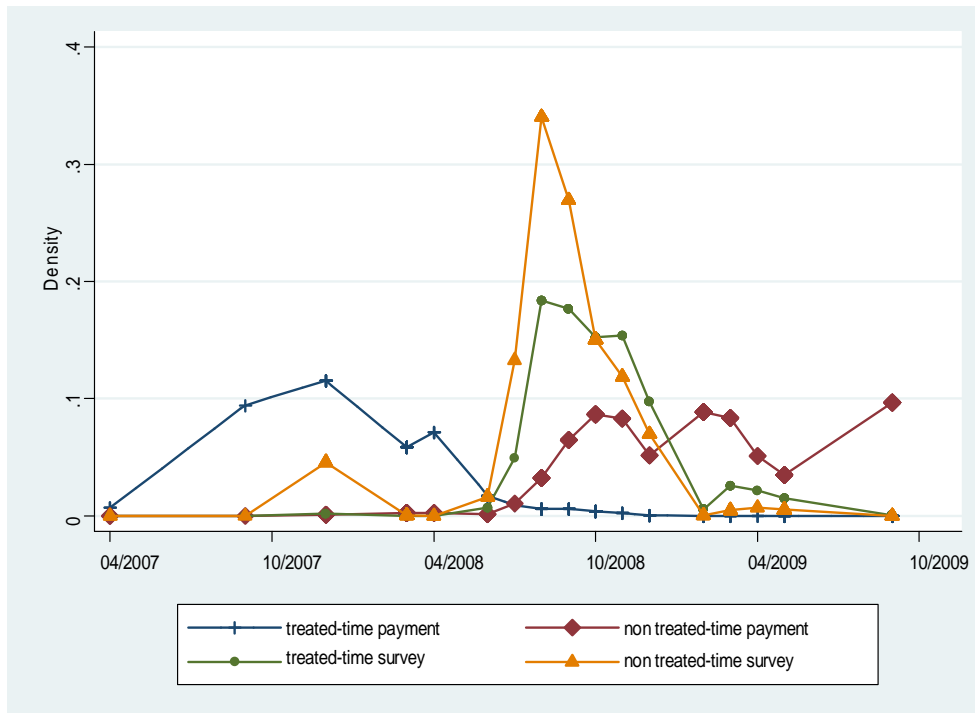
If the housing program were randomly assigned, one could estimate the effect of receiving the voucher program by comparing children living in families which applied to the program with children in families that did not apply for the intervention. As described in Section 3, both the placement of the program and whether to apply or not is far from random as the placement is targeted to poor families and the application reflects a choice made by eligible families. As a result, the direct comparison between applicants and not applicants would result in a biased estimate of the effect of the program.

Moreover, we are interested in estimating the effect of being able to convert the voucher into a new an adequate house, which is the final intention of the program, instead of just receiving it. The estimation of this effect is subject to an additional source of endogeneity as it entails the ability of a family to convert the voucher which may depend on unobservable characteristics that are likely to affect the outcomes. Failure to control for these variables would also result in a biased estimation of the effect of the program.

In an attempt to control for selection bias and identify a plausible causal effect of the program, I employ two different empirical approaches. It is by comparing the results between these strategies that I may give an indication of the causality of the program on children outcomes.

The first approach for identification exploits the variation in time of the different stages involved to obtain a voucher and convert it into a house and the variation in time of the second SELBEN survey to construct comparable treatment and control groups. Figure 2 depicts the distribution of the date of payment of the voucher (realization of a house) and the date of the second SELBEN survey and points out the fact that the period of the survey coincides with the normal implementation of the program. Thus, conditional on application and approval of the application, I can compare children in families that were able to convert the voucher and have a house before they were surveyed by the second wave of SELBEN (treated group), to children in families that converted the bonus in a period after the SELBEN survey (non treated group). By comparing within the group of approved applicants I manage to control for the endogeneity that arises from the eligibility

**Figure 2.** Density of time variables



criteria of the program, and the choice of the families to apply for a voucher.

Table 1 presents  $p$ - values of tests of differences in pre-intervention characteristics between the treated and non-treated groups. Although comparing groups within the subsample of approved applicants is intuitively better than using a sample of non-applicants or rejected applicants as control groups, the table reports that while most of the characteristics are balanced between groups there are small but statistically significant differences. A child in the treated group is on average 0.2 years older, has a household head that has 0.3 more years of education and a household spouse that has 0.4 more years of education than a child in the non-treated group. In terms of outcomes the only significant difference in pre-intervention characteristics is access to sanitation where a treated child has a likelihood of living in a house with adequate access that is 4 percentage points higher than its non-treated counterpart. In the analysis below I control for these observed differences.

The causal interpretation of any result that compares the treated and untreated groups depends on the exogeneity of three time variables which are the sources of variation used for identification: (i) the time of the application, (ii) the time of the follow up survey of SELBEN, and (iii) the time that elapsed from getting the voucher to converting the voucher. These variables are likely to be non-random as they may be correlated with unobservables that influence the outcomes. Examples include the urgency with which a family needs a house, the availability of information of the program that is accessible to the families in the different stages of the process, and the ability and skills of the family to

go through a process that involves several actors and links with different markets. If the least capable families were less likely to convert the voucher into a house, for example, we might expect untreated children to have worse outcomes than treated children, also in the absence of the intervention. This would bias the estimated effects upwards.

To get some indication about the exogeneity of the time variables, Table 2 regresses the time of the SELBEN survey and the time to convert the voucher on different pre-intervention variables taken from the first wave of SELBEN. As the table shows, while the time needed to convert the voucher is positively related with household size and number of children (both proxies of the need of a family to get a new house), the date of the survey is positively related with the ethnic origin of the household head and also with household size. The table also points out that families in the treatment group take on average 27 days less to convert the voucher than non-treated families, and are surveyed on average 42 days later than non-treated families.

In order to control for the potential bias brought by the endogeneity of the time variables I use fixed effects to extend the group definitions and compare (i) children of families that were surveyed by SELBEN in the same period of time, and (ii) children of families that spend the same amount of time to convert the bonus. The identifying assumption, in this case, is that after controlling for the time that a family takes to convert the bonus, and the date of the survey, the date of application is random. We consider this to be a plausible assumption as time of application and time for conversion are likely to depend on the same type of unobservables such as need, lack of information and the ability of the family to go through the process. At this point it is also important to remember that families can not influence either the process of evaluation of applications or the time of emission of the voucher whose duration is exogenous. The approach is complemented by comparing children that are of the same age when surveyed by SELBEN in order to control for the fact that the children were not surveyed at the same time and that older children have a higher probability to drop out of school and enter in the labor market.

Formally, the fixed effects approach give us the following empirical equation:

$$Y_{ij} = \alpha_1 + \beta_1 H_j + \gamma_1 X_{ij} + \theta_1 T_j + \delta_1 D_j + \lambda_1 A_{ij} + \varepsilon_{1ij} \quad (1)$$

where  $i$  and  $j$  indexes child and family.  $Y_{ij}$  is some outcome (ie. school enrollment) and  $H_j$  is an indicator variable for the intervention that switches on for treated families.  $T_j$ ,  $D_j$ ,  $A_{ij}$  are a set of dummy variables (fixed effects) for each possible category of time of survey, time for conversion and age respectively.  $X_{ij}$  is a set of pre-treatment characteristics of the child and families used as control variables. The impact of the intervention is capture by the coefficient  $\beta_1$ .

Equation 1 can be extended to fully exploit the panel nature of the SELBEN survey



**Table 2.** Exogeneity of time variables

| Variable           | Days<br>(1)           | Survey<br>(2)         |
|--------------------|-----------------------|-----------------------|
| treatment          | -27.682***<br>(7.297) | 42.033***<br>(4.338)  |
| SELBEN             | 0.214<br>(0.463)      | -0.211<br>(0.262)     |
| Household size     | 3.590**<br>(1.749)    | 1.969*<br>(1.110)     |
| Number of adults   | 6.615*<br>(3.635)     | 2.918<br>(2.260)      |
| Number of children | 2.871<br>(2.209)      | 1.845<br>(1.189)      |
| School mother      | -0.448<br>(0.864)     | 0.13<br>(0.448)       |
| School head        | -0.09<br>(0.788)      | -0.285<br>(0.405)     |
| Age mother         | 0.39<br>(0.344)       | -0.075<br>(0.180)     |
| Ethnicity head     | -22.224<br>(24.171)   | 52.565***<br>(19.682) |
| Activity head      | 3.753<br>(9.642)      | 0.931<br>(4.904)      |
| Income head        | -25.079<br>(20.361)   | -3.513<br>(9.865)     |
| Disabled head      | 0.973<br>(25.259)     | 6.152<br>(21.309)     |
| N                  | 2104                  | 2104                  |

*Note:* Each estimate results from a separate regression of the time variable on different pre-intervention characteristics. Robust standard errors clustered at the level of the household are presented in parenthesis.

\*/\*\*/\*\*\* denotes significance at 10/5/1% confidence level.

and estimate a difference in difference estimator. To identify an effect, this estimator combines differences in outcomes between treated and non treated groups, with differences over time within the groups. The resulting equation is:

$$Y_{ijt} = \alpha_2 + \beta_2 H_j + \pi_2 d_t + \omega_2 H_j \cdot d_t + \gamma_1 X_{ij} + \theta_2 T_j + \delta_2 D_j + \lambda_2 A_{ij} + (\varepsilon_{2ijt}) \quad (2)$$

where  $d_t$  is an indicator for pre and post intervention,  $H_j \cdot d_t$  is an interaction term and  $\omega_2$  measures the effect of the program. Although the same identification assumption that the one described for the single difference estimator of equation 1 applies, the double difference estimator controls for a new set of unobservable characteristics which do not vary with time within the groups and might jointly affect the date of application and the outcomes.

The second approach for identification uses the information of the composition of the families in the sample in order to exploit the variation in outcomes that exists across siblings within families that arises from the fact that siblings get the program at different ages. In this sense, we can compare a child that has been treated by the intervention using as a comparison group a sibling within the family that, at the same age as the treated child, did not benefit from the intervention. By comparing their outcomes at that specific age, we can control for unobserved family characteristics that are common for children within a family such as the urgency in the need for a house, their access to information about social programs or the ability to convert the bonus into a house. The identifying assumption for this approach is that unobserved child specific characteristics are not jointly correlated with the outcomes and the probability of being treated at a certain age.

Formally, the regression equation for this approach is:

$$Y_{ija} - Y_{i'ja} = \beta_3 (B_{ije} - B_{i'je}) + \gamma_3 (X_{ij} - X_{i'j}) + (\eta_{ija} - \eta_{i'ja}) \quad (3)$$

where  $Y_{ija}$  is an outcome of child  $i$  in family  $j$  at age  $a$ , for example 15 or 14 years old.  $Y_{i'ja}$  is the outcome for the sibling  $i'$  in the family  $j$  at the same age.  $B_{ije}$  is a dummy variable that equals 1 if a child  $i$  received the intervention in a moment  $e$ , where  $e \leq a$ , and is equal to 0 if the intervention was received later. While the data in the panel of SELBEN allows me to create enrollment of a child at a specific age, as described in Section 4, this process can not be replicated for other outcomes of interest in this analysis such as child labor<sup>9</sup>.

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<sup>9</sup>Following Fertig and Reingold (2007) an instrumental variable approach was also tried. In order to instrument the condition of receiving a voucher and being able to convert it into a house, two variables were used: gender composition of the households and the geographical (canton) variation on the supply of new houses. Although we acknowledge the limitations on the validity of these two instruments as they might also be correlated with outcomes (Butcher and Case (1994), Newman and Harkness (2002)) the instruments proved to be not relevant as the partial F statistic of the first stage regressions did not show a sufficiently

## 6 Results

### *Children Outcomes*

Table 3 reports estimates of the impact of the housing assistance program on school enrollment and child labor. Note that the estimates in this table are based on the specifications in equations 1 and 2 which uses the fixed effect approach. The first two columns present the results for the whole sample of children with age ranged 8 to 17 years old in the second SELBEN survey. The remainder of columns present results divided by age intervals: children younger than 15 years old, and children older than 15 years old. The age intervals reflect the transition that children in Ecuador do from compulsory school to non compulsory school where the likelihood of dropping out of school is larger.

Results are given for different specifications corresponding to varying set of controls. The first specification uses no control variables and, therefore, make no additional attempt to account for potential bias other than comparing treated and control children within a sample of approved applicant families. The second specification includes an extended set of pre-treatment control variables such as gender of the child, parental education (separately for each parent), age of the mother, a measure of household size and household composition, an index of socioeconomic status and dummy variables for whether the head of the household was indigenous, disabled, employed, or if received an income. The third and fourth specification add fixed effects for the time of the SELBEN survey and the time elapsed to convert the voucher respectively<sup>10</sup>. The fifth specification controls for both set of fixed effects at the same time while the sixth specification also includes fixed effects for age of the children. In this way, the last specification compares treated and untreated children of similar age in families that were surveyed by SELBEN in the same period of time and that spend the same amount of time to convert the voucher into a house.

Focusing on the regressions that use the whole sample of children, the sign of the estimated effect of the housing program in all the specification point to an improvement in school enrollment and a reduction in child labor. More importantly, while the size of the effect changes only slightly with the inclusion of different set of controls, their statistical significance varies. In the specification that includes all fixed effects (row 6) none of the outcomes is statistically significant.

When the treatment effects are broken down by age intervals (compulsory and non compulsory education) the results show a clear pattern in all specifications. While having an own an adequate house do not have an effect on school enrollment and child labor for children in the compulsory school's age, it has a positive and significant effect on improv-

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strong effect on the endogenous explanatory variable.

<sup>10</sup>This is implemented by dividing each of the two time variables in deciles and creating a set of dummy variables for each decile category

**Table 3.** Results on Children Outcomes. First Approach

| Specification          | 8 to 17           |                    | 15 to 17          |                    | 8 to 14           |                    |
|------------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|
|                        | Enrollment<br>(1) | Child Labor<br>(2) | Enrollment<br>(3) | Child Labor<br>(4) | Enrollment<br>(5) | Child Labor<br>(6) |
| (1) No Controls        | 0.024*<br>(0.01)  | -0.017<br>(0.01)   | 0.041*<br>(0.02)  | -0.040*<br>(0.02)  | 0.012<br>(0.01)   | 0.000<br>(0.01)    |
| (2) $X$                | 0.024*<br>(0.01)  | -0.019*<br>(0.01)  | 0.037*<br>(0.02)  | -0.038**<br>(0.02) | 0.008<br>(0.01)   | 0.000<br>(0.01)    |
| (3) $X_j, T_j$         | 0.023*<br>(0.01)  | -0.017<br>(0.01)   | 0.034<br>(0.02)   | -0.035*<br>(0.02)  | 0.011<br>(0.01)   | -0.001<br>(0.01)   |
| (4) $X_j, D_j$         | 0.025*<br>(0.01)  | -0.024**<br>(0.01) | 0.044**<br>(0.02) | -0.046**<br>(0.02) | -0.002<br>(0.01)  | 0.004<br>(0.01)    |
| (5) $X_j, T_j, D_j$    | 0.023<br>(0.01)   | -0.022*<br>(0.01)  | 0.040*<br>(0.02)  | -0.042**<br>(0.02) | -0.001<br>(0.01)  | 0.004<br>(0.01)    |
| (6) $X_j, T_j, D_j, A$ | 0.018<br>(0.01)   | -0.018<br>(0.01)   | 0.037*<br>(0.02)  | -0.039*<br>(0.02)  | -0.001<br>(0.01)  | 0.004<br>(0.01)    |
| (7) DD                 | 0.022<br>(0.02)   | -0.022*<br>(0.01)  | 0.042*<br>(0.02)  | -0.046**<br>(0.02) | -0.001<br>(0.01)  | 0.004<br>(0.01)    |
| N                      | 3369              | 3369               | 1704              | 1704               | 1665              | 1665               |

*Note:* Each estimate results from a separate regression using the fixed effect approach of equations 1 and 2. Robust standard errors clustered at the level of the household are presented in parenthesis. \*/\*\*/\*\* denotes significance at 10/5/1% confidence level. The set of variables  $X$  includes all the control variables in Table 1.

ing the enrollment of children in non compulsory school and reducing the likelihood of working of children between 15 and 17 years old. As for the whole sample, the effects of the program changes only slightly with the inclusion of control variables and the inclusion of different combination of fixed effects for the time variables.

The last row of table 3 presents the difference in difference estimator which exploits the pre-treatment information and controls for a new set of unobservable characteristics which do not vary with time within the groups. Compared to the results on the other specifications, this estimator show little difference in magnitude and point to the same direction. In the transition age between compulsory and non compulsory school, being treated by the program has a positive and significant effect on improving child enrollment by 4.2 percentage points, and a significant effect in reducing child labor by 4.6 percentage points with respect to the untreated children. Relative to the the base school enrollment and child labor rates, the size of these effects are substantial. They translate into a 17 percent reduction in the dropping out rate from the non compulsory track of the educational system and into a 22 percent decline in the fraction of working children at this age range.

Results of the impact of the program on the probability of a child to live in a family considered poor or extreme poor are presented in Table 4. Focusing on the most extended

**Table 4.** Results on the Probability of children to live in poverty. First Approach

| Specification          | Poverty<br>(1)      | Extreme<br>Poverty<br>(2) |
|------------------------|---------------------|---------------------------|
| (1) No Controls        | -0.224***<br>(0.02) | -0.221***<br>(0.02)       |
| (2) $X$                | -0.210***<br>(0.02) | -0.207***<br>(0.02)       |
| (3) $X_j, T_j$         | -0.201***<br>(0.02) | -0.193***<br>(0.02)       |
| (4) $X_j, D_j$         | -0.225***<br>(0.02) | -0.220***<br>(0.02)       |
| (5) $X_j, T_j, D_j$    | -0.220***<br>(0.02) | -0.205***<br>(0.02)       |
| (6) $X_j, T_j, D_j, A$ | -0.221***<br>(0.02) | -0.205***<br>(0.02)       |
| (7) DD                 | -0.205***<br>(0.03) | -0.203***<br>(0.03)       |
| N                      | 3369                | 3369                      |

*Note:* Each estimate results from a separate regression using the fixed effect approach of equations 1 and 2. Robust standard errors clustered at the level of the household are presented in parenthesis. \*/\*\*/\*\* denotes significance at 10/5/1% confidence level. The set of variables  $X$  includes all the control variables in Table 1.

specification including control variables and fixed effects in row (7) the estimates show that being exposed to the program and succeeded to have an own an adequate house decreases the likelihood of a child to live in poverty by 20 percentage points. The program also has the potential to reduce the probability of a child to live in extreme poverty by the same percentage points. Relative to a base of 75% of poverty and 38% of extreme poverty, the estimates translate into a 26 percent reduction on the poverty rate and 52 percent on the extreme poverty rate.

Table 5 presents the within family estimates of the effect of the housing program based on equation 3 which controls for unobserved family characteristics that are common for a child within a family and can not be taken into account in the previous approach. Specifically, this approach compares outcomes between a child that has been treated by the intervention and a sibling that did not benefit from it at an specific age  $a$ . To compare the results of this approach to the results obtained with the fixed effect approach, table 5 report estimates in the neighborhood of the transition age from basic to medium school.

Columns (1) and (2) present the estimates of the effect of the program on enrollment at age 12 and 13 respectively and point to an improvement of the outcome although they are not statistically significant. Columns (3) and (4) estimate the effect of the program at

**Table 5.** Results on children Outcomes. Second Approach.

| Specification                | Enrollment at age $a$ |                  |                    |                    |                  |                   |
|------------------------------|-----------------------|------------------|--------------------|--------------------|------------------|-------------------|
|                              | $a=12$<br>(1)         | $a=13$<br>(2)    | $a=14$<br>(3)      | $a=15$<br>(4)      | $a=16$<br>(5)    | $a=17$<br>(6)     |
| Treatment at age $\leq a$    | 0.037<br>(0.020)      | 0.038<br>(0.023) | 0.070**<br>(0.028) | 0.070**<br>(0.033) | 0.046<br>(0.036) | 0.014<br>(0.047)  |
| Treatment at age $\leq a, X$ | 0.035<br>(0.019)      | 0.032<br>(0.023) | 0.064**<br>(0.028) | 0.069**<br>(0.032) | 0.038<br>(0.036) | -0.001<br>(0.044) |
| N                            | 3803                  | 3321             | 2794               | 2324               | 1902             | 1475              |

*Note:* Each estimate results from a separate regression using the within family approach of equation 3. Robust standard errors clustered at the level of the household are presented in parenthesis. \*/\*\*/\*\* denotes significance at 10/5/1% confidence level. The set of variables  $X$  includes all the control variables in Table 1.

age 14 and 15 and finds a substantial positive and significant effect. Being treated at this age range or before increase school enrollment by 7 percentage points at the transition age compared to the enrollment faced by their older untreated siblings at the same age. Compared to the enrollment rate at age 15, it represents a 30% reduction in the likelihood of dropping out from the non compulsory track of the educational system. These results confirm the direction and the significance of the estimates obtained by the fixed effects approach. Columns (5) and (6) reports the estimates at age 16 and 17 which are smaller in size and less precise than the previous one. I interpret the latter as an indication that timing of the intervention is important to have an effect on school enrollment at the transition ages. Considering the sharp drop out of students between 14 and 15 years old and the inherent difficulty of recruiting students once they have left the educational system, the effect of having an own and adequate house at later ages is marginal or nonexistent.

### *Mechanisms*

I next look at the impact of the program on variables that may mediate the effect of having an own and adequate house on child outcomes and poverty. Results are presented in table 6 using the fixed effect approach and using as depend variables outcomes that represent the quality of the house's physical environment in which the family and the child's life unfolds. The outcomes include access to sanitation, quality of the floor (cement or table instead of dirt) and the availability of a shower in the house which is a proxy of family's access to source of safe water. As in table 3, the results are presented for different specifications which includes different set of control variables and fixed effects. The results reveal a clear pattern. According to the most extensive specification in row (6) the difference in difference estimator report positive effects of the program on all the housing environment variables. Being treated with the program and having succeeded to have a

**Table 6.** Results on Housing environment

| Specification       | Shower<br>(1)       | Sanitation<br>(2)   | Floor<br>(3)        | Overcrowding<br>(4)  |
|---------------------|---------------------|---------------------|---------------------|----------------------|
| (1) No Controls     | 0.201***<br>(0.023) | 0.122***<br>(0.020) | 0.092***<br>(0.012) | -0.212***<br>(0.022) |
| (2) X               | 0.193***<br>(0.023) | 0.111***<br>(0.019) | 0.090***<br>(0.012) | -0.214***<br>(0.021) |
| (3) $X_j, T_j$      | 0.191***<br>(0.024) | 0.108***<br>(0.020) | 0.092***<br>(0.012) | -0.212***<br>(0.022) |
| (4) $X_j, D_j$      | 0.211***<br>(0.024) | 0.109***<br>(0.020) | 0.086***<br>(0.011) | -0.209***<br>(0.023) |
| (5) $X_j, T_j, D_j$ | 0.212***<br>(0.024) | 0.108***<br>(0.021) | 0.091***<br>(0.012) | -0.205***<br>(0.024) |
| (6) DD              | 0.202***<br>(0.028) | 0.075**<br>(0.031)  | 0.083***<br>(0.018) | -0.191***<br>(0.030) |
| N                   | 2104                | 2104                | 2104                | 2104                 |

*Note:* Each estimate results from a separate regression using the fixed effect approach of equations 1 and 2. Robust standard errors clustered at the level of the household are presented in parenthesis. \*/\*\*/\*\* denotes significance at 10/5/1% confidence level. The set of variables X includes all the control variables in Table 1.

new house improves the availability of having a shower inside the house in 20% (relative to a base of 47% ), increases the access to sanitation in 7.5% (relative to a base of 71%) and improves the quality of the floor in 8% (relative to a base of 88%). In the same way, there is a substantial effect in decreasing overcrowding in 19 percentage points (relative to a base of 46%).

Although I can not confirm or ruled out the presence of other mediating factors that could explain the results on children outcomes such as better neighborhoods, more stability or better parenting skills, it seems clear that the intervention has a positive effect on providing a better physical environment for families than the one experienced in the absence of the program.

## 7 Conclusions

Despite the fact that housing is at the top of the policy agenda in developed and developing countries, the effects of housing assistance programs on the well being of families and individuals have been seriously understudied. This paper contribute to fill this gap by evaluating the effect of a greatly promoted ABC housing assistance program in Ecuador on school enrollment, child labor and its likelihood to take a family out of poverty. The ABC program grants a single voucher to poor families that can be used to support part of a new house investment which is complemented by family's savings and a mortgage loan.

The results show that being treated by the program and succeeding in convert the voucher into a house has a positive effect on school enrollment for children that are in the transition age from compulsory to non compulsory school. Moreover, this paper give evidence that the program also has a significant effect in decreasing the probability of child labor and reducing the likelihood of a child to live in poverty. The size of the estimates are particularly large in size, that is, they correspond with a 17 percent decrease in the dropping out rate from the non compulsory track of the educational system and with a 22 percent decline in the fraction of working children at this age range. With respect to poverty, the estimated effects of the program translate into a 26 percent reduction in the fraction of children living in poverty and 52 percent in the fraction living in extreme poverty.

Although the data available to this analysis do not allow to disentangle all the underlying mechanisms behind these effects, this paper has tested the link that goes from a better physical environment to better children outcomes. If housing assistance provides a better physical environment to families than the one experienced in the absence of the program and, by this mean, it leads to an improvement in the health status of the children exposed to the program (Mann et al., 1992; Coggon et al., 1993; Goux and Maurin, 2005; Cattaneo et al., 2009), it might be consider a fair mechanism that can partially explain the results on children outcomes. The estimations on physical environment show that the program is highly effective to improve the family's access to sanitation, safe water and better quality materials for the house. It also reduce the probability to live in an overcrowded condition. However, more research is necessary to get a better understanding on the importance of other mediating mechanisms such as neighborhood effects, better parenting and stability.

The evidence on this paper is specially relevant for policy makers in developing countries that have as goals the design of policies aimed at preventing the massive drop out of students in the non compulsory track, which is a pre-requisite to higher education, while also preventing child labor. The results highlight the fact that social benefits of housing should not be underestimated and should be taken into account as a key element in an strategy to overcome the vicious circle of poverty. Future research should be targeted to test the effect of housing assistance programs in rural areas where the fall in the enrollment rate during the transition to compulsory school is much larger, and also to measure the impact of programs aimed at improving the current quality of the house instead of assisting families to get a new house.



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