The Impact of Providing Psycho-Social Support to Indigent Families and Increasing their Access to Social Services: Evaluating *Chile Solidario*

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July 2009

Abstract

Chile Solidario is an innovative poverty program which targets indigent families in Chile. It attempts to lift families out of poverty through a coordinated set of stimulus to the demand and supply of social services, and through the provision of psycho-social support to beneficiary families. In this paper we analyze the short and medium term effectiveness of this program using both administrative and survey data. We use a RD design, exploring the fact that in order to be eligible a family must have a means-test score below a given cutoff, which varies by municipality. We find that the program leads to increases the take-up of subsidies and of employment programs. The impacts of CHS vary across families with different characteristics, and located in different municipalities: the impact of the program on the take up of subsidies is larger in municipalities with a better network of social services, for families served by social workers with relatively low caseloads, and in male headed families. The impact of the program on employment of spouse is larger in rural areas and for families served by social workers with relatively low caseload. We were not able to detect any positive impacts of CS on employment or income of the head.1

*We thank Patti Jara, Francisca Rivera and Veronica Silva for valuable comments, crucial feedback to improve our understanding about the program. We are indebted to Polly Jones for her support in the evaluation, and to Marcela Ines Salvador for helping at various stages of the evaluation process. We thank Alejandro Barajona, Pablo Coloma Correa, Paz Garcés, Rodrigo Herrera, Fernando Hoces, and Andres Hojman for facilitating access to the data used in this paper. We acknowledge the comments of Hilary Hoynes and Costas Meghir. Miguel Alonso Sarzosa provided excellent research assistance. This paper was supported by a grant from the Spanish Trust Fund for Impact Evaluation (SIEF) at the World Bank. Pedro Carneiro gratefully acknowledges the financial support from the Leverhulme Trust and the Economic and Social Research Council (grant reference RES-589-28-0001) through the Centre for Microdata Methods and Practice, and the hospitality of the World Bank and Georgetown University. Rita Ginja acknowledges the support of Fundacao para a Ciencia e Tecnologia and Royal Economic Society. These are the views of the authors and do not reflect those of the World Bank, its Executive Directors, or the countries they represent. All errors are our own.

1Web appendix: http://www.ucl.ac.uk/~uctprcp/chile_appendix.pdf
1 Introduction

A successful social protection system delivers effective welfare services to those who can use of them the most. Achieving both these goals is extremely difficult. Since the provision of public services is often shielded from the discipline of market incentives, and public accountability systems are imperfect, these services are often not provided in the most efficient way. Furthermore, the population which is most in need of these programs is usually at the margins of society, being hard to reach and hard to change.

Chile Solidario (CHS) is an innovative and ambitious system that attempts to improve the targeting of existing social services, by stimulating the demand for these services among indigent families in Chile, and reorganizing and expanding the supply of services. The stimulus to demand is done through visits of social workers to poor families, informing, encouraging and helping them to apply to the network of services they have available. The social worker role works within the families to help them restore their basic socio-emotional capabilities, and foster behaviors conducive to labor market success changes better family welfare, and engage them in a process to identify a family strategy to exit extreme poverty. On the supply side, different government agencies and local providers of social services coordinate in assessing the needs of each municipality and in providing the adequate supply of services so that the programs are channeled and tailored to the neediest population within each municipality. The program also includes a cash transfer component, relatively small in size, which aims at compensating participating households for the transaction costs incurred when connecting to social programs. This program was first introduced in Chile in 2002, and was gradually phased in over time.

The take-up of subsidies and services tailored to the family needs is perceived as a means to activate a process towards exiting poverty. Over time, the program aims at removing structural bottlenecks by strengthening the human capital of adults and expanding their employment opportunities and productive activities (via education completion/training/public employment or self-employment programs).

The popularity of CHS has spread beyond the national boundaries of Chile, in spite of the fact that a comprehensive quantitative evaluation of the long term effects of the program is not yet available. Many other Latin American countries are looking at the integrated ‘system’ as an example, and some countries have programs (such as the new Colombian program Juntos) that mimic several aspects of CHS. Furthermore, given the problem of low take up of welfare programs throughout the world, there is widespread interest from developed and developing countries on the lessons from CHS. Low take up is often seen as the result of imperfect information, transaction costs, stigma, and myopic behavior (Currie 2004). CHS attempts to address all these.

This paper provides an evaluation of the impact of CHS on the lives of the poor. It builds and expand on previous evaluation results by the authors. Galasso (2006) documented the short term impact of the program for the first two year cohorts entering in 2002/2003. The study found significant effects on the take-up of subsidies and social programs for employment and housing. The program showed short term improvements in access to education, and to a lesser extent, health services by program participants, but no estimated effects on employment or income in the short term. The estimated medium term effects of the program in 2006 (Carneiro, Galasso 2007) confirmed the effects on access to services, and documented the fact that CHS had improved the labor supply and income of rural households and helped them escape poverty and indigence.

The set of outcomes we consider is limited by data constraints, but also by the need to have a focused and informative analysis. In particular, we analyze the impact of CHS on: 1) take up of subsidies and participation in training and employment programs; 2) income and employment of
family members; 3) improvements in housing conditions; and 4) psycho-social welfare and attitudes of individuals. We study outcomes that are perceived harder to work with (such as housing and employment), but are also perceived as key dimensions that would allow participating households to escape indigence in a sustained way in the long run. Some of these outcomes may take time to materialize as families slowly grow their skills and assets as part of their family ‘life project’.

The main empirical challenge we face is in accounting for the fact that participants in CHS are systematically different from non-participants, and therefore we cannot simply compare the outcomes of the two groups of individuals. We rely on two strategies to address this difficulty, which are based on different assumptions. Unfortunately, it is likely that the two strategies estimate different parameters, even if their underlying assumptions are both valid. We comment on this below.

One identification strategy explores the fact that a family’s eligibility to CHS depends on whether the family’s score on a index of unsatisfied basic needs (a proxy means test, CAS) is below a given cutoff. In particular, those families just eligible, i.e., with a (CAS) score just below the cutoff, should be similar to families just ineligible, i.e., with a (CAS) score just above the cutoff, in all dimensions but one: eligibility. Therefore, any difference in the outcomes of the families in these two groups can be attributed to a differential rate of participation in the program, induced by differential eligibility. This is the method of regression discontinuity (RD).

One important criticism of the RD method is that it only captures the effect of the program for individuals at the margin, but this is not much of a concern in our study. At least for the first five years of the program the eligibility cutoffs varied widely across municipalities. This means that it is possible to identify the impact of the program for individuals for a continuum of margins, defined by the continuum of cutoffs that we have in the data.

In implementing this strategy and estimating cohort-specific effects we faced a practical problem: the effect of eligibility on the probability of participation in CHS at any given cohort is quantitatively small for families around the eligibility cutoff. This means that, even if the program has a substantial effect on the lives of the poor for this set of families, it will be hard to detect in the data. Since very few families at the margin of eligibility are induced to participate in the program if they were to become eligible, the program has the chance to act only on a limited set of families, so the comparison between eligible and non-eligible families shows very diluted effects, detectable only with very large sample sizes.

The method of differences in differences (DD), which we also use, alleviates this problem at the expense of stronger assumptions. It compares participants and (observationally similar) non-participants (say, with the same CAS score), before and after participation in the program. The central idea of this method is that the change in outcomes for participants before and after their participation in CHS is the result of the program and of underlying trends in the economy, whereas the change in outcomes for non-participants over the same period reflect only trends in the economy. Assuming the trends in the economy affect the two groups in the same way, and differencing changes in outcomes between the two groups, we can estimate the effect of the program. One important difference relatively to RD is that the comparison is directly between participants and non-participants (as opposed to eligible and ineligible individuals), bypassing the problem that the effect of eligibility on participation is small. Unfortunately, it is not likely that the parameters estimated by RD and DD are the same in the presence of heterogeneity in impacts, so they are not directly comparable (furthermore, it is likely the way we implement DD leads to an underestimate of the effect of the program).

We use a combination of administrative records and survey data purposively collected to evaluate the program. Administrative records are useful because of they are available for millions of
individuals, and include objective measurements of each family’s CAS score, and of each family’s participation on a variety of welfare programs. The survey data, which can be linked to administrative records using individual identifiers, provides us with a much smaller sample but a larger set of outcomes. It is especially important for the analysis of income (and hence poverty) which is poorly measured in the administrative data, and of psycho-social variables, which are not available in the administrative data. One problem with the survey data is that the sample is not representative of the population of interest. We attempt to overcome this problem by reweighting the data back to a representative sample, but the construction of the weights is not straightforward.

Our main results are that the program increases the uptake of subsidies and of the employment programs provided by FOSIS (the only ones we were able to measure so far). These impacts are present for some but not all cohorts and length of exposure, but the overall pattern of impacts leads us to believe that these effects are stronger for later cohorts and that they are fairly robust. The RD estimates are larger than the DD estimates, at least when they are statistically significant, but the DD estimates are more stable across cohorts and years. These results indicate that CHS is somewhat successful in stimulating demand for these services, and also making supply available to respond to the additional demand. The impacts of CHS vary across families with different characteristics, and located in different municipalities. For example, the impact of the program on the take up of subsidies is larger in municipalities with a better network of social services, for families served by social workers with relatively low caseloads, and in male headed families. Conversely, the impact of the program on employment of the spouse is larger in rural areas and for families served by social workers with relatively low caseload.

In spite of this, we were not able to find any positive impacts of CS on employment or income of the head. The totality of male headed families had been already been working in the absence of the program, so the scope for improvement of the employment of the head were very small. If anything, estimated effects are mildly negative, possibly resulting from disincentive effects of public transfers, that dissipate over time. It is important to note that the employment effect (and hence the income effects) is absent also for female headed households, who represent a important vulnerable group within the target population.

The main channel through which we detect employment, income and poverty effects comes from activation the labor force participation of the spouses of the heads. There, using the DD specification in the administrative data and the RD specification in the survey data, we are able to find some impacts of the program. The effects are larger for later cohorts, for whom, the supply side has significantly expanded to attend the target population. The pattern of the impact of the employment of the spouse mirrors the take-up of the employment programs. The enhanced employment of the spouse provides a small but important source of complementary income for rural households and households whose head with lower educational attainment. For these subgroups, the employment effect translates into gains household labor and total income per capita, and poverty/indigence, which we can detect only using the survey data.

We find some impact of the programs in housing conditions (in the DD specification in the administrative data, and in the survey data). Previous evaluations had documented the impact of the program on improved access to municipality programs that would provide short term solutions to weather the house from rain and cold. Over time, the program effects materialize in improved access to adequate sewage systems and in legalization of housing situation. Housing, together with employment, is one of the dimensions where participating households have the largest share of

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Given that the effect we estimate is a result of demand and supply stimulus, in future work we will try to quantify the proportion of the overall effect due to increase in supply of services and pure increase in demand for them.
deprivations at program entry, and that are reported in qualitative work as key dimensions for the long term improvements in their well-being.

The survey data in the last rounds of the panel dataset also help us document mixed effects of the program on psychosocial dimension of welfare. Unfortunately, the impact of the program is sensitive to how questions are framed over time. The most consistent impact of the program on the psychosocial dimension is on optimism towards the future, in line with the program logic of activating the ability of the participating households to project themselves into the future with a concrete life project. There are some mild effects of the program on self-esteem and self-efficacy in the employment domain. Against these positive effects, we found negative effects of the program on the perceived social support, as well as on the psychosocial distress of participants. More work is needed in the future to improve on the measurement side of the domains and triangulate the scales with the qualitative gains that have been observed in qualitative research.

Finally, an interesting result that we could document by tracking individuals over time in the administrative data is that participation in CHS leads to a more stable family structure for younger families. The program works against a background of very fluid changes in family composition. We find that younger households are less likely to experience change in headship as a result of having participated in CHS. The effect is mainly driven by a lower propensity to transition to single headed headship. The most likely channel through which this effect materializes is through the dimension of family dynamics, where the social worker works with family members to improve the communication, conflict resolution, norms of cohabitation among family members, and, for a subset of participating families, through access to a set of programs aimed at specifically improve those habits and competencies.

The paper proceeds as follows. In the next section we describe the program. We follow by describing the data, explaining the empirical strategy, and discussing our results. The last section concludes.

2 Program background

Chile Solidario is a system of social protection for families in extreme poverty, that combines aid and skills development in an integrated approach (Ministry of Planning, 2002). The program targets families in extreme poverty based on proxy means test, Ficha CAS (up to 2006). Since 2007, the targeting instrument for all social programs in Chile has switched from a proxy means test that intends to capture some key socio-economic correlates of unsatisfied basic needs to a novel instrument (Ficha de Proteccion Social, FPS) that intends to measure the household income generating capacity and its vulnerability to shocks.

Chile Solidario has four components:

1. An intensive phase of psycho-social support - implemented through the outreach activities by a local social worker or technical staff to each home. During these visits, the social worker works with the family to identify its main problems, and the main steps they need to take to solve them; raise awareness of available social services and stimulate take up. It lasts for 24 months, with decreasing intensity. The multidimensional aspect of deprivation is operationalized in terms of defining a set of minimal critical conditions, which aim at measuring a minimally acceptable level of well-being along different dimensions (identification/legal documentation, family dynamics, education, health, housing, employment, income). As many of the minimum conditions are either already attained by the families at entry, or do not
correspond to the given demographic profile of the family, on average, families have 8-12 minimum conditions that need to be complied with during the intensive phase of the program. The families commit to put their effort in meeting those unmet priority conditions, by signing 'partial contracts' with the social worker. According to this contract government takes responsibility for supplying services and resources and families commit to overcome problematic aspects of their lives, using the opportunities offered by the government.

2. Cash transfer conditional on the family meeting the contract (in practice, given to everyone). The transfer ('bono de protección familiar') lasts for 24 months and amount declines over time. For example, in 2006, during the first six months in the program families would receive $12,320 pesos, for the second semester the transfer added up to $9,387 per month, and for the third and fourth semesters the value was $6,454 and $5,393, respectively. The transfer is uniform across families, and it is meant to be a compensation for the transaction costs that households incur when connecting to the supply side services within its municipality (learning about eligibility and program rules of different programs and the process costs associated with the application process).

3. Guaranteed Cash Subsidies. Families are guaranteed all subsidies they are entitled to. Until September 2004, families applying subsidies through Chile Solidario were allocated to vacancies assigned to the municipality, competing with non-Chile Solidario families. Over time, the constraint on the vacancies on these cash subsidies (with respect to PASIS and SUF) has been relaxed, so that all eligible families that apply for the subsidy are automatically enrolled as recipients.

4. Preferential access to social services. Even with a given local supply of services, the program has made them available to the CHS population with preferential access, in the sense of providing priority access to the existing supply side, should they chose to activate their demand for the services. The concept of preferential access is really crucial in the logic of the program, as the target population is made 'visible' to the local municipalities.

The supply side component aims at ensuring coordination among different social programs and public services at the national and the municipal level. Public programs and services were previously available for eligible households only upon demand. CHS works directly with municipalities, which are the local providers of public services, and national programs by making sure that the supply side is locally organized to attend the needs of its specific target population and 'bridge' the demand gap. These supply side efforts aim at making sure that the services are pertinent to the needs of these families, which could go as far as inducing changes in design, outreach strategies, or even the organization of new types of programs. Up to 2004 the program worked within the existing supply side of programs in the municipality. The supply side response at the national and

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3The average monthly per capita income for those families with valid Ficha CAS is 2005 is $33,000 pesos.
4The cash transfer component of Chile Solidario is substantially lower than for the amount received by beneficiaries of PASIS are entitled to receive around $50,000 pesos. In comparative terms, the ratio of the transfer to the income (consumption) of the median household corresponds to 6% in Chile, compared to other conditional cash transfers programs in the region (20% in Mexico, 13-17% in Colombia and 29-31% in Nicaragua) (World Bank, 2008).
5Namely, family allowance SUF, old age public pension (PASIS) and water subsidies (SAP).
6The rationing persists with respect to the water subsidy (SAP): Chile Solidario families are entitled to be assigned the subsidy during the first year of psychosocial support even if there are no sufficient vacancies in the municipality.
municipal level was activated after CHS became a national law in 2004, with increasing budgets transferred to be executed directly by the municipalities on earmarked CHS-related services.

3 Data

There are two main data sets to study the impacts of this program.

3.1 The Panel Chile Solidario

The first data source is a longitudinal survey panel (panel CHS), which was collected specifically for evaluating the impact of the program. The panel sample for the evaluation has been constructed from the nationally representative household survey -the Caracterización Socioeconómica Nacional (CASEN) of 2003. The longitudinal sample contains a sample of CHS participants and a 'suitable' comparison group of non-participating households followed up at one-year intervals from 2003. This longitudinal sample has been re-interviewed in 2004, 2006 and in 2007 during the same time of the year. The survey instrument in the CASEN is multi-topic, ranging from questions on demographics, employment, income, education, health status and utilization of services to access to public subsidies and transfers.

A revised questionnaire in the follow-up surveys includes a model on intergenerational mobility (with proxies of parental income and subjective perceptions of future investment in education), and perceptions questions about the awareness of social programs in the communities. The 2006 and 2007 waves of the panel survey provide for the first time quantitative measures of welfare aspects of the target population for which only qualitative assessments were available in the past and help shed some light on the links between psychosocial wellbeing and poverty. A detailed description of the survey instruments and the domains they intend to capture are available in appendix D.

3.2 Administrative data

The second data source is administrative data consisting of the records of the main targeting instrument used to identify the group of disadvantaged individuals targeted by different social programs in Chile and to determine the eligibility status of families/individuals for housing programs, health programs, schooling programs and cash-transfers (Larranaga, 2005). This instrument was a proxy means score called CAS score and it was replaced in 2007 by Ficha de Proteccion Social (FPS). Also, as a condition to enroll in Chile Solidario families must possess (obtained from a short instrument called Ficha CAS).

The original sample we use comprises the set of Ficha CAS and FPS databases including individuals surveyed between March 1998 and May 2008, on a total of almost 47 millions observations covering almost 12 millions individuals. Subsequent cross-sections of the CAS and FPS data can be merged using the unique individual ID number in Chile (called RUT), creating an individual panel.7

The two data sources are complementary to each other. Survey based data are much richer in covariates and outcomes. The survey instrument in the panel Chile Solidario is multi-topic, rang-

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7This is a biennial panel because Ficha CAS is valid ('vigente') for two years, so for example, the CAS for 2004 contains individuals (families) that were surveyed between January 2003 and December 2004. The Ficha CAS for 2006 only includes households surveyed between January and September of 2006. In this paper we only have at most one observation per family recovered under the new instrument - FPS.
ing from questions on demographics, employment, income, education, health status and utilization of services to access to public subsidies and transfers, modules on intergenerational mobility, perceptions questions about the awareness of social programs in the communities and instruments to capture the key role of the psycho-social support in the intervention. Moreover, the fact that surveys are administered by trained interviewers enhances the likelihood of having better measured data.\footnote{A potential threat to the quality of the survey data are comparability issues for those variable whose definition slightly changed over time. The consistency and comparability of some key variables was complicated by the fact that all waves subsequent to 2003 were administered by different survey firms. We restricted our analysis to those variables that are as comparable as possible over time, and flag issues of potential incomparability in the results section.} The panel CHS is instrumental to document income and poverty dynamics: all the income questions were drawn from the CASEN survey, and as such could be used to construct comparable income aggregates and poverty estimates. The panel has however a few drawbacks associated with its representativeness. The planned sample was to keep a compact set of participating households from the CASEN 2003 and follow them over time together with a sample of ‘observationally equivalent’ non-participants. Unfortunately, the actual sample ended up deviating from the planned one in 2004. The sample finally selected ended up being composed of better off non-participating households, and under-sampled eligible non-participants. While this issue does not have a bearing on the internal validity of the estimated effects, it has implications for the empirical method that can be applied to the survey data as well as to the ability to extrapolate the results to the target population. We will discuss this issue more at length in the data and results sections.

Administrative records, in contrast, usually contain a limited set of outcomes and socio-economic characteristics. The outcomes available in Ficha CAS are employment, income, some basic housing characteristics and take-up of subsidies (SUF, PASIS and SAP). Some key outcomes, such as income, are very imperfectly measured, as in the case of income originated from self-employment, as reviewed in detail in appendix A. The recent FPS has an expanded set of employment variables, and more disaggregated information about school enrolment and health care access. Yet, administrative data has several features that make it attractive for evaluation purposes. First, with more than five million individuals per year, program impacts can be estimated with higher precision. This is particularly valuable in an empirical setting as in ours where the data needs to be thick around (multiple) discontinuities. Second, the large administrative data collected at different points in time allows us to precisely identify cohort of participants, and therefore characterize the impact of the program for groups with differential duration into the program. Third, as administrative databases are automatically updated over time, they offer an important time dimension, that allows to describe how the impact of the program evolves over time. Finally, the survey panel data was designed to track households over time. We can use the administrative data to document how sensitive the results are to issues of attrition, changes in household composition (changes in headship, household splits) and migration.

### 3.3 Puente Data and Program Monitoring Instruments

Two additional sources of monitoring data were collected from the program. The first is monthly information on all families participating in the program collected by the agency in charge of implementing the first two years of psycho-social support (Puente). The Puente database is instrumental in identifying with precision the identity of the participating families in both the panel CHS data as well as the CAS/FPS data, as all datasets can be merged using the individual identifiers. In addition, for each participating household, we can retrieve the identifier of the social worker, and...
calculate therefore calculate each worker caseload at a given point in time. Our latest release of this data (August 2007) includes all families covered by the program since it was launched in June 2002 through August 2007.

The second source of administrative data which will be used in the analysis is a monitoring instrument at the municipality level containing a set of qualitative indicators on the local supply side (Instrumento de monitoreo al funcionamiento de la red local de intervencion, REDES). The objective is to obtain indicators of different dimensions of the way the local services are organized in the logic of local ‘system’ of social protection. The set of questions are organized along three main themes: (i) indicators that measure the degree of involvement of the local institutions (municipality and suppliers of local services) to the red local (e.g., whether they understand and share the need to work in network, whether the institutions adapt the supply size to the needs of the families; (ii) indicators that measure the degree of knowledge and dissemination of the program; (iii) indicators that assess the degree of institutionalization of the ‘red’. The questionnaire is close-ended, with open-ended sections for comments. Each indicator is structured to have four possible answers, ranked from low to high. The instrument is qualitative in nature but organized in a way that allows to construct an index score which can be used as a proxy of the quality of the local system of social protection at one point in time. The information used was collected between November 2005 and January 2006, but to the extent that there is a strong permanent component in underlying quality measures, we can use the score to characterize the heterogeneity of impact on the supply side, with a special focus on the take-up of subsidies and social services.\(^9\)

### 3.4 Employment programs

As discussed more in depth in the section in data description, families in the target population are characterized by high level of labor informality. Qualitative data shows that employment (‘trabajo’) is one of the dimensions that participating families find harder to work with, due to a combination of low (hard and soft) skills, low labor force attachment (in the case of women) and low psychosocial self-efficacy to develop (Asesoría al Desarrollo 2005, Espigar 200X, Mideplan 2009). Among all services to which CHS families are given preferential access to, employment programs stands out as an important group to analyze, as a ‘stable’ employment with a regular source of income that is perceived as a key pathway to exit poverty. While we cannot causally trace the channel of the impact of CHS that originates from such programs, we can nonetheless document who takes up such programs, and whether the same groups for whom we observe gains in employment and income are the same groups that take-up such programs.

There are three broad groups of employment programs offered to the target population: (i) training programs, and programs that aim at fostering employability, competency based (mainly provided by FOSIS, SENCE SERNAM and PRODEMU; (ii) public employment programs (provided SENCE and FOSIS) and (iii) self-employment programs (mainly provided by FOSIS). As mentioned above, the supply side response was activated after 2004, when the CHS was passed as a national law. After 2004, some new programs were created to meet the unsatisfied demand of the target population (mostly programas de desarrollo competencias/habilitacion laboral, programas apoyo al microemprendimiento, programas apoyo a la produccion familiar), and tailored

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\(^9\)The instrument was developed as a management tool and a monitoring instrument and for internal diagnostics. It was administered to the Unidad de Intervencion Familiar or UIF which comprised all social workers and the municipal employee in charge of coordinating their activities (head of the UIFs). Its application was supervised by the provincial representatives of the program. By its nature, the program offers a snapshot of the ‘quality’ of the local system at a given (and intermediate) point along the program timeline.
according to their profile (mainly women, with low educational attainment and little or no previous employment history and low employability).

We have access to the individual records of participation to the main employment programs from 2004 onwards, so far only for programs provided by FOSIS.\textsuperscript{10} These data can be merged to the CAS/FPS data using the individual identifier (RUT/RUN). We will use the information on employment programs, merged with our main administrative CAS/FPS data for three main purposes. The first is to document how the targeting of such programs towards CHS participants evolved over time. The objective is to assess how program assignment responded to demand needs by improving in either size/vacancies or reorienting its geographic allocation according to the number of CHS families with pending minimum conditions in the employment dimension. These trends on coverage of existing programs, together with the creation of new programs especially targeted to CHS families will help document the supply side response to the program.

Second, when we restrict the analysis to those employment programs available to both CHS and non CHS families, we can test whether eligibility (and participation) to CHS is a significant predictor of participation to these employment programs. This take-up analysis will provide an indirect test of the ‘preferential access’ of CHS families to employment services.

Finally, if we restrict the analysis to participants in employment programs that are open to both CHS and non CHS families and use the CAS/FPS data to measure outcomes, we can test the value added of the CHS by estimating whether CHS families have an improvement in employment and income paths over and above other employment program participants. In order to do so, we will apply the same empirical methodology used for the administrative data (RD and DD) to estimate the impact of the program, but use the subset of the CAS/FPS data that refers to the subpopulation of participants to these employment programs. The results from this exercise will illustrate whether CHS families have higher returns compared to non-CHS families participating to the same employment programs, possibly due to the synergies that CHS families have by working on multiple and complementary dimensions of welfare.

### 3.5 Data description

Table 1 in Appendix F provides descriptive statistics of the variables present in the CAS/FPS databases. Table 1 in Appendix G provides a description of the sample size and quality of the merge between administrative and survey data: out of 6744 households surveyed in all waves of panel, only 74 were not found in administrative records, as they did not apply for CAS/FPS; table 2 presents descriptive statistics of variables in the panel CHS.

#### Targeting and coverage

The target of the program was determined in 2002 according to the estimated number of indigent people in the country (5.7% in the CASEN 2000), with an estimated target number of 225,000 families. The program was phased-in gradually between 2002 and 2005.\textsuperscript{11}

These four year-cohorts will be the main subject of our evaluation. After the last cohort in 2005, the program was institutionalized as a permanent component of the social protection system in the country, and implemented on a rolling basis with an average of 40-50,000 participating families per year. Eligibility to the program was defined based on a predetermined CAS threshold, what we

\textsuperscript{10}The list of employment programs is provided in the appendix E.

\textsuperscript{11}Chile Solidario was initially implemented in 2002 in four regions (Antofagasta, Maule, Magallanes y Metropolitana) as a pilot program to serve 14,000 families and it was enlarge to the rest of the country in May 21, 2002.
call the "official cutoff". In order to ensure a wide geographical coverage of the program, a decision was made to allow the official thresholds to vary across municipalities and regions, with the aim of reflecting differences in the poverty rates across different geographic areas. The CAS threshold varied across municipalities but is constant across years. Households within municipalities were sequentially invited to participate to the program, by starting from the bottom up of their CAS distribution.

While better targeting does not necessarily provide a useful predictor of the poverty impact of antipoverty programs (Ravallion, 2008), it is nonetheless of interest to document the degree to which the program attained its stated objective to reach the poorest 5% segments of the Chilean population. Two main types of targeting error have been highlighted in the literature (see review in Van de Walle and Nead, 1995): leakage of the (ineligible) non-poor (errors of inclusion or type 1 error) and incomplete coverage of the poor (errors of exclusion, or type 2 error). One way to document the targeting performance of the program is to look at the coverage rate among the eligible population over time. Figure 1A, which plots the participation rate by year at 20 CAS points’ intervals, provides a graphical description of the table: the totality of the families below 450-460 CAS points are eligible to participate, and the eligibility monotonically declines from 450-460 up to around 500. The cumulative participation program coverage for the first four year of the program reaches about 50% in the bottom CAS intervals by 2005. In weighing the two types of targeting errors, most of the targeting performance can be explained by incomplete coverage rather than by errors of inclusion, as the proportion of ineligible who are assigned the program is virtually non-existent (below 1% at any CAS interval). Another way of looking at the coverage rate of the program is along the income distribution of the entire population as observed in the CASEN 2003 (table 3 - Appendix G). On average, the sequential entry ensured good targeting performance, with 40% of the beneficiaries in the lowest decile of the income distribution, and 60% in the poorest 20% of Chileans individuals, well above the median of other social assistance programs in Latin America (Coady et al 2004). Overall, the program exhibits higher coverage of rural families. Yet, the coverage is still limited, with 19% of the bottom 5% of the national income distribution participating into the program, and lower coverage rates for higher deciles.

One final concern when thinking about the program ability to reach the target population is to assess how many families in extreme poverty were lacking a ficha CAS (for not having had any previous contact with public services in the past). The program operational guidelines took this concern into account, and encouraged municipal workers during the process of locating the population of invited households to apply the CAS or FPS to families that are detected to be a potential beneficiary of the program but does not have the ficha. The concern about the coverage of the potentially eligible target population, is not as much whether families have ever been in the CAS system, but for how long they stay in the system. The CAS database has expanded over time to include a larger number of individuals and families (table A). Yet, there is evidence of substantial churning in and out of the CAS database (table 2B, Appendix F). About half of the families who are ever eligible in the CAS database are present for more than half of all years in the database. Those who stay in the system for a longer period of time are more likely to be eligible, and more likely to enter. But among the ever eligible, those who are less permanent in the system are those families with relatively lower CAS scores. Among the ever eligible, participants are drawn relatively more from families that more permanently present in the system. We believe that this churning provides a lead into the relatively low take-up of the program among the ever

12 Table 2(A) provides the same information, but adds the also the population found in each range of CAS
13 According to the analysis of the 1998 CASEN (Larranaga 2005), 91.5% of the families the bottom decile of the imputed CAS distribution in the CASEN had a ficha CAS.
eligible: the CAS-based targeted system, by its nature, made it harder for the program to reach families that were drawn into the system only temporarily.  

**Overall Trends in outcomes**

A more direct visual description of the trends over time in the CAS database can be found in Figure 2. The graphs focus on families in the neighborhood of the endogenous cutoffs (20 points below or above), and within the same CAS interval, separately by ever participation to the program. Take-up of subsidies among program participants seems to increase substantially at the year after eligibility is assessed (for example, take-up measured in 2003 for families eligible or near eligible in 2002), which is likely to be potentially linked to the increased take-up for program entrants. The graphs are also clearly pointing out that the intervention was introduced within the context of otherwise growing economy, as indicated by the increasing trend in family per capita income, for both eligibles and near-eligibles. It is also notable that the employment of the head stays quite stable over time, while there are signs that the employment of the spouse increases for program participants, one or two years after the program onset.

The same overall positive trends are observed in the panel Chile Solidario (figure 3). For illustration purposes trends in outcomes are drawn for the sample of households in the neighborhood of the official cutoff in 2003. The graphs on the right hand side represent near eligible and near ineligible households. The graphs on the left hand side of each panel represent ever participants and non-participants households. The graphs show a positive upward trend in (log) household autonomous income per capita, with steepest increases over the period between 2003 and 2006. These improvements are mirrored by significant reductions over time in the incidence of poverty and indigence for both groups along the eligibility and participation dimension. It is also noteworthy to observe an increase in the share of labor over total income for participants over time (against an otherwise stable share for non participants). Some clear differences in trends between the two groups appear when looking at employment outcomes. The share of adults who are employed is steeper for both eligible and participating households; employment of the head exhibits a slight downward trend (possibly due to aging within a fixed set of panel heads) mostly among non-participants; finally the employment rate of spouses increases at a steeper rate over the time frame of the analysis for participating households compared to non-participants, consistently with the administrative data trends.

**Psychosocial outcomes**

The psychosocial support dimension is a key innovation and building component of CHS and has been recognized by law as an integral component of the intervention. The social worker conveys information and elicits the families’ unexpressed demand for those public programs that meet their needs. At the same time the social worker is a catalyst to help households realize what their assets and priorities are, devise a strategy (their ‘life-time project’), and develop a set of endowments (assets, skills, abilities, information, autonomy and self-efficacy) that would allow

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14 As some of the churning is accounted for by family splits with the creation/destruction of families (either because of change in location or due to changes in household composition). As we explain in more detail in Appendix A, the identifier of families in CAS is linked to the address of a family and to its order within the household, therefore mixing physical mobility of families and mobility within a household and changes in family composition. So in practice, we track a family over time by the ID of its head. In future work we will refine this analysis as it is possible to identify the reason for change in headship.

them to autonomously sustain their exit from extreme poverty in the long-run. Qualitative work in Chile has highlighted the key role of the psychosocial support in the perceived welfare change among beneficiaries.\textsuperscript{16}

A detailed description of the scales, their distribution and psychometric properties is provided in Appendix D. The experience of introducing these dimensions has been insightful and highlighted the importance of two basic aspects: measurement and (expected vs actual) stability.

First, measurement issues are a crucial factor that needs to be taken into account when reading into the results of the evaluation. The comparability of the results over time and across samples is complicated by the fact that some of the instruments questions or items have slightly changed over time. We looked at the full scales that are separately consistent for years 2006 and 2007 separately, as well as to those scales which are constructed with only those items that are common over time.\textsuperscript{17} The corresponding densities are presented in figures 9.

As discussed more at length in appendix D, the scale of psychosocial distress is the Mental Health Inventory (MHI-5 of Veit and Ware (1983)). The measure is intended to capture psychosocial distress, not depression, with the former more focused on the perceived awareness of what is happening. The items are scored such that a higher scores means lower distress (or better mental health). It is interesting to note that using commonly used thresholds as an indicator of major distress (17 as in Stillman, McKenzie, Gibson 2007, or 19 as in Yamazaki et al 2005), about half of the individuals interviewed in the panel CHS exhibits high levels of distress (echoing the results on depressive symptoms for rural women in Mexico, by Fleischer, Fernald and Hubbard 2007).

The self-esteem scale and both self-efficacy scales are skewed to the right, with a large mass of people concentrated at the top of the distribution. In the case of the self-efficacy scenarios, the skewness is more severe when we restrict the analysis to those items that are consistent over time. The scenarios that are present in both years might be perceived ‘too easy’ so that a large fraction of the respondents bottom up. This does not invalidate the scale, but calls for more experimentation about how to frame scenarios that capture a wider variation in the perceived barriers or in the type of actions that the individual would activate. The scale of perceived support from friends, on the contrary, is skewed to the right, with a bimodal distribution, with a large mass of respondents with low perceived support.

The second consideration refers to the time variability of these measures, whether they are expected to change, and the extent to which that they are susceptible to change as a result of an intervention. Some psychosocial dimensions aim at capturing more dispositional constructs, such as internal-external locus of control, that might be slightly affected by life events, but are more likely to be more stable personality traits that are not likely to be affected by the intervention. The choice of other instruments (such as the self-efficacy ones) were specifically were driven by the objective of identifying psychological domains that were pertinent to the nature of psychosocial support that the families engage with the social worker and be more malleable to change, even among adults (see Ozer 2009).

Most of the instruments chosen for the analysis (with the exception of the scale of external

\textsuperscript{16}See, to cite a few, the study on the psychosocial effect of the program on women (U. Chile 2004b), the study on needs and aspirations of families that just exited the two-year period of psycho-social support (Asesorias para el Desarrollo, 2005) and the study that look at family trajectories of families followed up three years after the exit from the Puente Program (Mideplan 2009).

\textsuperscript{17}Moreover, given the fact that the typical CASEN is administered with proxy respondents, an additional source of noise and measurement error arises from the fact that, even within the same household, different individuals might be responding to the same question in different years. We will present results with sensitivity analysis on the degree to which the results might be affected by consistency of definition and respondent, as well as with sensitivity with respect to the sample chosen (balanced panel or not).
control) have overall good psychometric properties, as measured by standard factor analysis of the inter-correlation among items of a given scale.

When we focus on the subset of measures that are consistently defined over time, we observe two interesting stylized facts:

(i) these measures are fairly stable over time (as can be seen in figure 3), with the exception of self-efficacy in employment, which slightly increases over time for participants and decreases for non-participants, and optimism toward the future, which is stable among participants but negatively sloped for non-participants with and without controlling for the identity of respondent over time (a one year period between 2006 and 2007 in our analysis);

(ii) most scales exhibit low socio-economic gradients in the context of the sample of the panel CHS (Table 4). The socio-economic correlates are of the expected signs: employed individuals have higher self-efficacy in the employment domain, higher self-esteem and better orientation towards the future; younger individuals have higher self-esteem, optimism towards the future and lower perceived family support; optimism towards the future is higher among more educated individuals; the presence of disabled individuals in the household is correlated with lower optimism, psychosocial distress, lower self-efficacy and self-esteem. Yet, household autonomous income per capita has low correlations with most of the scales. Overall, individual, household and community socio-economic characteristics can account together for a small fraction of the overall variance of these scales. The results echo Das et al (2006) who document how mental health status has a stronger association with changes in life circumstances and shocks, than with levels of income or consumption in a cross-section of multi-purpose household surveys as the one used for the evaluation.

4 Empirical Strategy

Our first empirical method for assessing the impact of the program is the method of regression discontinuity, which we explain here. A family is eligible to participate in the program if (up to 2007) its CAS score is below a pre-determined cutoff score, which varies across municipalities. Therefore, a natural way to evaluate the program is to compare outcomes (take-up of subsidies, employment, income, and others) of eligible families with CAS scores just below the cutoff with those of ineligible families with CAS scores just above the cutoff. These two groups of families should be almost equal since they have CAS scores which are very close to the cutoff, except for the fact that some are eligible to receive the program and some are ineligible. Therefore, the latter are a good control group for the former. In principle, this comparison should be done within municipality since the cutoff scores vary across municipalities. It is important to discuss three important details regarding the implementation of this method.

First, due to the gradual phase-in of the program, and the extent of incomplete coverage among the eligible, official cutoffs are not good predictors of participation, especially for earlier entrants (as shown in table 3). Second, figures 1 and 4 suggest that even though a large number of families are eligible to participate in the program at any given time, cumulative entry into the program accounts for about half of the eligible target population and is well below 100%. As a result, it may be difficult to detect differences between outcomes of eligibles and ineligibles, especially when participation rates are very low. When this is the case, we need very large sample sizes to estimate the impact of the program. This has important bearings on the statistical power of the method. For example, it may be hard to detect program small impacts by implementing the method of

18 Whereas figure 1 presents estimates of participation around the eligibility cutoff in each year, figure 4 refers to cumulative participation across distribution of CAS score.
regression discontinuity on the Panel Chile Solidario, even when such effects can be detected in the much larger administrative database (but even in the latter database we may face problems of statistical power).

In practice, there was only gradual enrolment of eligible families in the program. It was impossible to serve all eligible families simultaneously right from the starting date of the program, and instead a gradual expansion was planned. Within municipalities, the poorest families (as determined by their CAS score) were to be served first, but this was more a guiding principle than a strict rule to be followed. As a result, the official cutoff was rarely an important determinant of participation, especially in the first years of the program. The effectively binding cutoff at any given point in time was generally below the official cutoff, and the way it was determined depended on the number of beneficiaries negotiated for each year, the number and characteristics of eligible families in the municipality, and how easy it was to find and serve eligible families. In sum, while the official cutoff for each municipality was clearly defined, the effective cutoff was not produced by a specific rule.

One important problem is that we do not know exactly where the effective cutoff is for each municipality, although it is possible to approximate it using a simple statistical procedure. For each municipality and for each cohort there is an unknown CAS score above which families are not eligible to participate in the program. If we group families by CAS score and calculate program participation for each group, we should observe a large decline in participation at the effective cutoff score. One can design a statistical procedure that replicates this intuition and determines the approximate cutoff score for each municipality. The procedure used to find the discontinuity in the probability of entering in the program in each year is described in detail in Appendix C.\textsuperscript{19} The group of families used in each municipality is composed of all families with a valid Ficha CAS that in year \( t \) are not attending the program. Then, we run regressions of participation on a dummy of eligibility:

\[ D_{ijt} = \alpha + \beta E_{ijg} + \varepsilon_{ijt} \]  

where \( D_{ijt} \) is an indicator that takes value 1 if family \( i \) residing in municipality \( j \) enters in the program in year \( t \) and 0 otherwise (entrants in future cohorts are thus part of the control group, whereas we exclude families already in the program to find the CAS cutoff as by definition they are not part of the group of possible families to be invite) and \( E_{ijg} \) is an indicator that takes value 1 if the family is eligible to participate in Chile Solidario. Then, define a grid with intervals of 2-points CAS along the municipality’s distribution of CAS and for each point \( g \) in the grid a family will be eligible if family’s CAS is smaller or equal to \( g \), \( CAS_{ijt} \leq CAS_{g}^{ijt} \). To ensure that there are families on either side of the discontinuity we use data on the interval: [\( CAS_{ijt}^{\text{min}} + 20, CAS_{ijt}^{\text{max}} - 20 \)] for each municipality \( j \) in each cohort \( t \). For precision matters, we exclude municipalities with less than 50 families and municipalities without entrants. For each municipality the threshold for eligibility is then defined as the CAS score that maximizes the \( R^2 \) of equation (1) as in Chay, McEwan and Urquiola, 2005, Card, Mas and Rothstein, 2008. In other words, the sequential roll out implies that each municipality will have not only the official cutoff, but also multiple thresholds that are relevant to different cohorts entering at different points in time. The distribution of thresholds relevant for each year is presented in Figure 5. With sequential entry from the bottom up of the CAS distribution, the endogenous cutoffs increase over time for each municipality (on average\textsuperscript{19}

\textsuperscript{19}In tabulations not presented in the paper, we divided each municipality’s distribution of CAS in ventiles and we found that the discontinuity in participation for the 2002 cohort was in general in the bottom 5-10% of the distribution.
\( \overline{\text{CAS}}_{j}^{2002} < \overline{\text{CAS}}_{j}^{2003} < \overline{\text{CAS}}_{j}^{2004} < \overline{\text{CAS}}_{j}^{2005} \) which in turn should be below the official cutoff, where \( \overline{\text{CAS}}_{j}^{y}, y = \{2002, ..., 2005\} \).

In this study we are partly immune to the criticism that the method of regression discontinuity only uses data on families with CAS scores close to a specific cutoff, ignoring most of the population which is located far from the cutoff. Fortunately, there is a multitude of cutoffs (which becomes larger when we consider endogenous as opposed to official cutoffs), allowing us to estimate the impact of the program for a very large range of families. The ability to make inferences on a larger range of families participating in the program can be seen in Figure 6 (bottom). It is still true that we will not be able to estimate the effect of the program for those with either very low CAS scores or with very high CAS scores, since no municipality will have a cutoff score in their vicinity, but (at least at the bottom) these will be at the extremes of the CAS distribution.

### 4.1 Regression Discontinuity: Basic Setup

Let \( Y_{1ij} \) be the outcome with the program for individual \( i \) residing in municipality \( j \), and \( Y_{0ij} \) be individual \( i \)'s outcome without the program. Let \( D_{ij} \) denote program participation. \( X_{ij} \) is a vector of observable variables influencing the outcome, and \( U_{ij} \) is an unobservable also influencing the outcome. The gain of the program is \( \beta_{ij} \) and it can vary across individuals: \( \beta_{ij} \) can be a function of \( X_{ij} \) and/or of unobservables. Finally:

\[
Y_{0ij} = \alpha_{j} + f(X_{ij}) + U_{ij} \\
Y_{1ij} = \alpha_{j} + \beta_{ij} + f(X_{ij}) + U_{ij}
\]

so that

\[
Y_{ij} = \alpha_{j} + \beta_{ij} D_{ij} + f(X_{ij}) + U_{ij}. \tag{2}
\]

Let \( E_{ij} \) denote eligibility to the program, which is determined by a simple threshold rule:

\[
E_{ij} = 1 \text{ if } \overline{\text{CAS}}_{i} \leq \overline{\text{CAS}}_{j},
\]

where \( \overline{\text{CAS}}_{i} \) is each individual’s CAS score and \( \overline{\text{CAS}}_{j} \) is the relevant threshold the \( j^{th} \) municipality, where individual \( i \) resides.

#### 4.1.1 Imperfect Compliance

If there is perfect compliance then \( D_{ij} = E_{ij} \). Provided there is “enough” sample size in each municipality, one could construct a regression discontinuity estimator for each municipality. Each municipality has a different threshold \( \overline{\text{CAS}}_{j} \).

Let

\[
Y_{j}^{+} = \lim_{\overline{\text{CAS}} - \overline{\text{CAS}}_{j}^{+}} E(Y_{i}|\overline{\text{CAS}}_{i} = \overline{\text{CAS}}) \\
Y_{j}^{-} = \lim_{\overline{\text{CAS}} - \overline{\text{CAS}}_{j}^{-}} E(Y_{i}|\overline{\text{CAS}}_{i} = \overline{\text{CAS}})
\]

and assume these limits exist, and \( \overline{\text{CAS}}_{j}^{+} \neq \overline{\text{CAS}}_{j}^{-} \). Then, Hahn, Todd and Van der Klauww (2001) show that:

\[
E(\beta_{i}|\overline{\text{CAS}}_{i} = \overline{\text{CAS}}_{j}) = Y_{j}^{-} - Y_{j}^{+}.
\]
This comparison among near eligible and near non-eligibles is referred to as intention-to-treat parameter (ITT) (or reduced form). This parameter represents a lower bound of the impact of the program. However, in practice compliance is not quite perfect. The general concern in evaluating assigned social programs is generally that households with highest expected gains from the program self-select into the program. In the case under study, families get invited to participate to the program and the fraction of families who get invited but decide not to participate in the program is insignificant. As a consequence, the scope for selection bias on the family or demand side is very limited. The scope for selection bias might arise from the supply side, as local administrators have some discretion in deciding who participates and who does not at any given point in time. The concern might be relevant in a setting with a limited number of beneficiaries relative to the pool of eligibles within each municipality. If that’s the case, it is reasonable to suspect that those who opt out of the program are not a random sample of the eligible population. Let

\[ P_j^+ = \lim_{CAS-i \rightarrow CAS-j} E(D_i|CAS_i = CAS) \]

\[ P_j^- = \lim_{CAS-i \rightarrow CAS-j} E(D_i|CAS_i = CAS) \]

In that case, Hahn, Todd and Van der Klauww (2001) show that, in a neighborhood of the cutoff (i.e. for a small \( e > 0 \)):

\[ \lim_{e \rightarrow 0^+} E[\beta_i|D_i(CAS_i = CAS_j - e) - D_i(CAS_i = CAS_j + e) = 1] = \frac{Y_j^- - Y_j^+}{P_j^- - P_j^+}. \]

In the particular case where there are no ineligible participants (i.e. \( D_i(CAS_j + e) = 0 \) for all \( e > 0 \)), \( P_j^+ = 0 \), we can rewrite this expression as:

\[ \lim_{e \rightarrow 0^+} E[\beta_i|D_i(CAS_i = CAS_j - e) = 1] = \frac{Y_j^- - Y_j^+}{P_j^-}, \]

or

\[ E[\beta_i|D_i(CAS_i = CAS_j) = 1] = \frac{Y_j^- - Y_j^+}{P_j^-}. \]

We can interpret \( E[\beta_i|D_i(CAS_i = CAS_j) = 1] = E[\beta_i|CAS_i = CAS_j, D = 1] \) as “treatment on the treated” for those who have \( CAS_i = CAS_j \).

### 4.1.2 Implementation

Our first goal is to estimate \( E[\beta_i|D_i(CAS_i = CAS_j) = 1] \). Intuitively, this entails estimating \( Y_j^-, Y_j^+, P_j^- \) and \( P_j^+ \) for each municipality. In practice this may be hard to implement if the sample for each municipality is small. Furthermore, if \( E[\beta_i|D_i(CAS_i = CAS_j) = 1, M] \) also depends on municipality variables \( (M) \) it is not immediately obvious how to best summarize the estimates coming from different municipalities. A simple alternative is to construct \( DCAS_{ij} = CAS_{ij} - CAS_j \) and then notice that

\[ E_{ij} = 1 \text{ if } DCAS_{ij} \leq 0. \]

In other words, we normalize the CAS score for each individual by the cutoff value in his/her municipality of residence, and then use this normalized variable in a standard regression discontinuity model with a single discontinuity, which is at 0. Under this specification \( \beta \) is a weighted
average of $\beta_{ij}$. We present results for the overall sample, but in order to allow for some heterogeneity we also analyze several partitions of the original sample, corresponding to different values of observable characteristics.

The gains from the program can be estimated parametrically in both the administrative and the survey data. We report the coefficients where the outcome is regressed against eligibility $E_{ij}^c$ at any given time (the reduced form or ITT), and when the outcome is regressed on participation instrumented by the eligibility status (IV). In both sets of results, we control for a flexible specification of the distance to the cutoff ($DCAS_{ij}$). The current results from the administrative data use a quadratic spline on distance to cutoff with a knot at distance 0. The results from the survey data control for a cubic in the CAS level in 2003. All the results also control for municipality fixed effects and are done within narrow bands around the relevant thresholds ($-/+20$) (as in Chay, McEwan, and Urquiola (2005)). Note that the main difference in the results come from the fact that the administrative data looks at windows around the year-cohort specific endogenous cutoffs, whereas the panel CHS looks at a given window around the official cutoff (as measured in 2003).

The large sample size of the administrative data allows us to assess the sensitivity of the results to functional form assumptions, and estimate the RD effects non-parametrically, with local linear regressions of each outcome on $DCAS_{ij}$ at each side of $DCAS_{ij} = 0$, using a biweight kernel with a bandwidth of 12-points.

### 4.2 Differences-in-Differences Specification

While the evaluation had been designed after the program had started, there is still scope for assessing the robustness of the results, by relying on pre-intervention data. The administrative data allows us to observe a set of families who were also present in the CAS before the program was introduced (in 2000 and 2001). The survey data was collected after the program had started, but data collection was designed to capture subsequent entrants at each wave. As a consequence for a subset of later cohorts, we have observations before the start of the program (2003, and 2004 for cohorts 2004, 2005 and 2006).

Within the set of eligible families at any given point in time, the methodology compares the same families before and after the program, for participants and non-participants. The identifying assumption is that the trend in outcomes, in the absence of the program, would have been the same across both groups. Using within family variation over time for each cohort (2002-2005) allows us to net out any time-invariant unobserved heterogeneity. For each family $i$ resident in municipality $j$ in year $c$ we estimate the effect of entering in Chile Solidario in year $c$ on outcomes measured in year $t$ by:

$$Y_{ijc}^t - Y_{ijc}^{before 2002} = \gamma_0 + \gamma_1 CS_{ijc} + u_t + (v_{ij}^t - v_{ij}^{before 2002})$$

where $Y_{ijc}^t$ is family’s $i$ outcome in year $t$, $Y_{ijc}^{before 2002}$ is family’s $i$ outcome in 2000 or 2001 (whenever available), $CS_{ijc}$ is an indicator variable that takes value 1 if family entered in CHS in year $c$ and 0 otherwise, $u_t$ is a year fixed effect and $v_{ij}^t v_{ij}^{before 2002}$ are idiosyncratic shocks.

One major problem with this specification is that the control group becomes contaminated over time, as more and more non-participating families at year $c$ become subsequent participants in CHS. Our conjecture is that this will result in downward biased estimates of the effect of the program, with the bias becoming more serious as we progress through time. In other words, the DD

\footnote{We also experimented with Epanechnikov and gaussian kernels. Standard errors are obtained by nonparametric bootstrap with 1000 repetitions.}
estimates are likely to be too small, and should be read and interpreted with this caveat in mind. One natural alternative would be to differentiate all the cohorts in each sample. Unfortunately, the resulting estimates had too large standard errors to be of interest.

4.2.1 Panel Chile Solidario

We present RD for 2002 and 2003 cohorts with effects evaluated at different years (2004, 2006 and 2007). As the number of eligible non-participants is quite small within each municipality, the panel does not lend itself to estimate the effect of the program using the endogenous cutoffs, as there are very few eligible non-participants within each municipality (according to the endogenous cutoff) to be able to implement the same specification used in administrative data; to correct for the imbalance distribution of participants and non participants around the eligibility cutoff in survey we present weighted estimates.

The first wave of the panel Chile Solidario was collected after the program had started in conjunction with the CASEN 2003. However, data collection for subsequent waves was designed to capture newer year-cohort of entrants. As a consequence, for a subset of later cohorts (2004, 2005 and 2006), we can use earlier data points (mainly in 2003 and 2004) as pre-program base-line observations and rely in differences-in-differences methods. To estimate short run effects we estimate:

\[ Y_{ijt+1} - Y_{ijt} = \gamma_0 + \gamma_1 CS_{ijt} + u_t + (v_{ijt+1} - v_{ijt}) \]

where \( Y_{ijt+1} \) is family’s \( i \) outcome in year \( t + 1 \), \( Y_{ijt} \) is family’s \( i \) outcome in year \( t \), \( CS_{ijt} \) is an indicator variable that takes value 1 if family entered in CHS in year \( t \) and 0 otherwise, \( u_t \) is a year fixed effect and \( v_{ijt} \) is an idiosyncratic shock.

5 Empirical Results

5.1 Validity of the RD procedure

In the administrative data, we assess the impact of the program mainly in four key areas: access to subsidies, labor market outcomes, income and families’ housing conditions; we also study the impact of program in health and education related variables available only in Ficha de Protección Social. The program should have a direct effect on access to subsidies. It is also possible that there are some effects on labor market outcomes, coming through the increased participation of program beneficiaries in training and employment programs, and through the psycho-social stimulation they are subjected to during the first two years of the program. We present results for 2002 to 2005 cohorts of program.

We present mainly numerical results, but provide also some graphical results for regression discontinuity estimates. In the graphs we only present results of nonparametric regressions using a biweight kernel and bandwidth of 12 CAS-points. We present standard errors obtained by nonparametric bootstrap with 1000 replications, which may offer more accurate asymptotic inference than the analytic standard errors (Cameron and Trivedi, 2005). In the tables with numerical analysis we include parametric estimates with a quadratic spline on distance to cutoff with a knot at 0. In our main results we include families with CAS score was at most 20 points below or above the discontinuity score.
We start by showing that program eligibility is a good determinant of program participation, especially when we use endogenously determined cutoffs to determine eligibility. Recall that the variable determining eligibility is $DCAS_{ij}$, defined above. Figure 4 plots the proportion of the population participating in Chile Solidario at each level of $DCAS_{ij}$ using families in each CAS data set between 2002 and 2005. In order for our design to work there has to be a discontinuity in program participation when $DCAS_{ij} = 0$, since this is the point at which families switch from being eligible to ineligible. Regression discontinuity design would be invalidated if families were able to manipulate their CAS score in order to gain eligibility to the program. This assumes that families know the relevant cutoff they face to be eligible to the program. Neither the official cutoff, let alone the endogenous/implicit cutoff that we estimate for each cohort were announced. As a consequence, the concern for sorting raised in similar settings (as in Camacho, Conover 2008) is not likely to apply to our context.

Figure 4 is quite crucial to describe our RD design: each endogenous cutoff determine participation at the cohort-year when eligibility is determined. The figure shows a clear discontinuity, of about 15%, on the take-up of CS each year around the relevant endogenous cutoff. It is important to observe from this picture that such discontinuities around year $t$ cutoff stay constant over time. This means that there might exist subsequent entrants both to the left and the right of the cutoff, but their entry is not affected by the threshold at $t$, as endogenous cutoffs between two consecutive years increase over time. As a consequence, even with subsequent entrants, the endogenous cutoff at time $t$ identifies both the short and long term effect of participation at $t$.

Figure 5 presents the same estimates using households in Panel Chile Solidario. Panel A presents the take-up of the program around the endogenous eligibility cutoffs, while panel B presents the take-up of the program in the neighborhood of the official cutoffs. The shape of the participation rates across different cohorts is qualitatively similar to the graphs shown for the administrative data, with endogenous cutoffs inducing entry only for the relevant cohort of eligibility. What is different is the relative weight of participants vs. non-participants around the relevant cutoffs. The cumulative participation to the program among the eligible families reaches on average 80-90% (using the endogenous cutoffs) which is well above the population average of about 50% available from the administrative data. The saturation is more stringent for the 2002 and 2003 cohorts, which refer to lower CAS cutoffs and the reweighting of the data to make it representative of the CAS population at the year of eligibility does not help. The graph, in comparison with the equivalent version of the administrative data, confirms that the survey panel Chile Solidario ended up under-sampling eligible never participants. This has important implications for the interpretation of the results when applying RD methodology using the endogenous cutoffs: with a sample of very few never participants within municipalities, the method would end up picking up differential effects rather than the effects of the program relative to a counterfactual of not participation. The issue is less severe in the case of the official cutoffs (panel B) where the cumulative participation among the eligible reaches about 70-80%. As a consequence, due to this data constraint, we will apply the RD method using the official cutoffs. The RD results using the panel data are still internally valid. The sampling constraint has just a bearing on the extrapolation of the results to the population of CHS participants.

In order to provide reassurance to the validity of our empirical methodology and our identification strategy, we present results from a falsification exercise (Imbens and Lemieux, 2007). The idea is to take pre-determined variables that are known not to be affected by the program and test the empirical methodology treating such variables as outcomes. Not finding any statistical effect of the program on such covariates should provide reassurance about the plausibility of the identification assumption. Since program participation cannot affect pre-program variables, these
tests usually consist in checking whether there is any discontinuity at DCAS=0 in pre-program variables (e.g.: employment and take-up of public subsidies). Figure 7 shows that these are not important concerns in our sample. Table 4 (in appendix F) presents a more formal tests for the administrative data. All RD results presented will have their underlying falsification exercise on any subgroup analysis we do with the administrative data, and those results that do not seem robust to the specification are flagged in italics. The same falsification applied to the panel Chile Solidario is presented in table 4 (in appendix G). The falsification test is applied to predetermined variables can be drawn from the intergenerational module, with childhood characteristics, as well as from the labor force history of the household head collected retrospectively in the CASEN 2003. The falsification test passes for all pre-determined variables in the panel data.

5.2 Results

5.2.1 Characteristics of families that participate in CHS

The heterogeneous universe of program participants Table 5a presents the estimates of program participation as a function of eligibility (to the endogenous cutoff), a functional specification of the CAS score (expressed in terms of distance to the cutoff), and household and municipality characteristics. A few patterns are worth mentioning. First, even controlling for a flexible specification of the CAS score, participating families are more likely to be relatively worse off, having younger heads, with lower education, female headed, and being biparental families, with lower family per capita income before the program (measured before 2002). Second, adding covariates on participation to the program, or municipality fixed effects does not affect the point estimates of the eligibility indicator, which reinforces the idea that the endogenous cutoffs are orthogonal to household or municipality characteristics. Moreover, including or not including municipality effects does not affect the sign, magnitude and significance of the family characteristics, which suggests that the scope for selection bias is likely to be negligible. Both panels A and B in table 5 provide a comparison of the determinants of participation across different cohorts. Later cohorts have on average higher CAS scores, in line with sequential entry of families within municipalities. In addition, subsequent cohorts are progressively more likely to be living in rural areas, and relatively more biparental/male headed compared to the first entrants in 2002.

5.2.2 Take-up of Public Subsidies

The results in tables 6 show that the program induced a substantial increase in the take-up of public subsidies across different cohorts. The magnitudes are in the range of 2-20% and larger for relatively younger families, whose head is below 50 years of age. When we focus on the take-up of specific subsidies, we find that the largest share of the take-up in public subsidies is accounted for by the take-up of SUF concentrated among families whose head is 18-35 and 36-50 years old. We were not able to detect any significant impact of the program on the take-up of the old pension PASIS, nor on the SAP, the water subsidy.

It is interesting to note that the short term impact of the program on subsides take-up improves over time. For instance, the one year effects (DD estimates) for the youngest cohorts increase from 5.1% for cohort 2002 to 9.6% for cohort 2004. An analogous pattern applies to the two years effects. This dynamics is suggestive of improved performance of the program over time, due to a combination of increased vacancies assigned to municipalities according to their target population as well as the effect of enforcing the ‘guaranteed’ access to these subsidies for the Chile Solidario participants.
In table 12 we investigate how these effects varied with families’ and municipalities’ characteristics, and we find that larger effects are associated to municipalities where the average caseload of the social worker is lower, in rural areas and areas where the quality of the municipality (as measured by the indice de redes) is higher than the median. The effect is also larger for families with lower educational attainment, as defined by heads with no education or incomplete primary education.

5.2.3 Labor market outcomes

Results presented in tables 7 show that the program has no effects or mild negative effects on the employment rate of the head in young families. The margins for improving labor force participation of the younger male heads are relatively narrow, as the totality of them is already working (about 93-94% of family heads below the age of 50, as seen from table 5b, Appendix F). For families with relatively older heads aged 51-65 there is evidence of positive effects that range between 2 and 3%. For these older families, results from the FPS in 2007 (Table 14, Appendix F) suggest that the positive effect on employment of the head is associated with more stable employment, with a significant increase in the probability of having labor contract. What is notable is the lack of effects for female headed households (which on average with a participation rate of about 60-70% for younger families, table 5b, Appendix F).

The main employment effects from the program, consistently estimated from both the administrative data and the survey data originate from activation of the spouses’ labor supply. From the administrative data, we can document significant increases in the employment of the spouse starting to materialize after families exit the intensive phase of the program, (table 7, panel B, Appendix F, DD results). The effects are stronger for later cohorts, with two year effects ranging from 1.5 percentage points for cohort 2003 to 3-6 percentage points for cohort 2005, and the three year effects range from 2 percentage points for cohort 2002 to 4-6 percentage points for cohort 2005. The increase is quite substantial, as the Table 11 (panel B) describes the heterogeneity of impact for spouse employment across two cohorts 2003 and 2004. The comparison is interesting, as cohorts started before 2004 had to work within the existing local supply of services and employment programs, whereas later cohorts had access to a large supply of programs. The impact is larger when the caseload of the social worker is below the median, and for cohort 2004 in rural areas, for heads with lower education and male-headed families.

The spouse’s labor supply response is confirmed by the analysis using the panel Chile Solidario. There are no significant effects of the program on the employment rate of the household head. When looking at the early cohorts (2002 and 2003), there is a mild negative effect on the employment of the head, which dissipates over time. In contrast, there is a positive effect on the employment of the spouse, both when looking at the early cohorts as well as when looking at ever participation to CHS, and for both short and long term effects. Most of the spouse employment effect originates from women entering the labor force from inactivity. The heterogeneity of the employment results in the panel data confirm the patterns highlighted in the administrative data, with larger effects of the program on the probability of having the household spouse exiting inactivity and being employed in rural households, biparental households, and households with relatively lower educated heads.

5.2.4 Employment programs

How much of the employment effects are explained by access to employment programs provided through the program? While a direct causal link documenting this channel of impact cannot be
established, it is interesting to document whether the patterns of take-up of employment programs by Chile Solidario participants mirrors the results on employment outcomes. In the current analysis, we will use the administrative data available from FOSIS, which is one the main service provider of wage and self-employment programs that aim to reach the target population.

Table 11, Appendix F presents evidence on the take-up of employment programs from FOSIS that are open to both CHS and non-CHS families. The table presents RD estimates of take-up of these programs for different cohorts. Testing whether participation in Chile Solidario increases the take-up of these programs is a suggestive evidence of the fact that preferential access to social programs is acted upon by both the demand and the supply side. Estimates show strong effect on the take-up of these programs by heads families, with take-up by CHS heads ranging between 2 and 7%. We also find evidence of strong increase in take-up of these programs by the spouse, with an estimated increase between 4 and 6%. As the share of program participants to these programs is predominantly females (about 80%), participants are drawn from either female headed families, or from spouses in biparental families. Take-up is larger for CHS families in their second year of psychosocial support (e.g. cohort 2004 participating in 2006). Municipalities had to work with the set of existing employment programs available within the municipality up to 2004. Subsequently the ‘oferta programatica’ was reoriented to (i) increase the targeting towards the universe of CHS participants and (ii) improve the coordination of different programs within the same municipalities. The improved targeting towards CHS families can be documented in table 10, Appendix F: within the same number of vacancies nationwide each year, the table shows that the share of FOSIS programs allocated exclusively to CHS families has increased over time to account for 2/3 of the total allocation.

Employment programs that are exclusively targeted to CHS (reported in table 12, Appendix F) are more likely to reach spouses, families living in rural areas and with higher unemployment rates, and over time families with lower educational attainment.

A final exercise can be done by looking at the subset of all participants to employment program available to both CHS and non CHS individuals. By applying our empirical method, we can estimate the impact of CHS on employment outcomes over and above non CHS families participating to the same employment programs. The hypothesis being tested is whether CHS families have higher returns from these programs, possibly due the synergy with other dimensions that are part of the CHS (such as having preferential access to child care or the psychosocial support). The results are presented in table 13, Appendix F and show significant effects of CHS participation on employment and income of the spouse among FOSIS participants; effects on employment of head are statistically insignificant or negative effects on employment head.21

### 5.2.5 Income and poverty effects

According to the logic of the program, program effects on autonomous income may take time to materialize as families slowly grow their skills and assets as part of their family ‘life project’. As such, it is important to document the evolution of the effects over time, as they are not expected to be observed in the first two years of psychosocial support. The tables will present total family

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21 An evaluation of public employment programs and of the Programa de Insercion Laboral y Empleo by FOSIS between 2000 and 2005 led by University of Chile (DIPRES 200X) shows that these programs had a significant impact of short term employment (with larger effects on PUENTE participants and on women), that do not translate in short run income effects. An analogous impact analysis of competency based programs (Programa de Nivelacion de Competencias Laborales) led by the same teams at University of Chile (DIPRES 200X) documents analogous patterns, with employment effects mainly concentrated on females and no effects on either income nor formalization.
(or household) per capita income, income of the head and the spouse. Characterizing the source of sustained income for different types of households along the life cycle dimension can be indicative of the pathways of the program effects, with autonomous income important for relatively younger families, and public transfers (namely pension or social assistance) for families with elderly above 65 years of age and the presence of disabled. Autonomous for whom a sustained form of income is expected to be a key channel to move and stay out of poverty.

The administrative data (table 8, Appendix F) shows no effects on the log of the income of the head, nor family income per capita. There are mild signs of long term effects of the program on the log income of the spouse for younger cohorts (with family head between 18 and 35 years of age). The measurement of income in the administrative data is however not satisfactory in the administrative data, with a large share of imputed income from self-employment activities (see discussion in Appendix A).

The panel CHS (table 9, Appendix G) shows no income effects on average, but positive and significant effect of the program on income, labor income per capita, poverty and indigence confined to households in rural areas, and households with household heads with education below completed primary. Impact takes time to materialize for the cohorts 2002 and 2003, increases over time in magnitude and significance. Stronger short term effects for later cohorts (as documented in the DD) with a significant effect on indigence, driven by effects in rural areas, and for biparental households.

Female labor force activation of the spouse, by providing a second source of income, is a key correlate of sustained poverty reduction and lower vulnerability in Chile (Mideplan 2007, Equity Commission 2008). Still, qualitative work shows that formal employment remains still a preferred option, but seen as unattainable given the low skills and labor force experience. Women are aware of high failure rate associated with self-employment activities, and perceive it to be more as a tool to generate complementary income within the household rather than a main source of income.

When thinking about poverty outcomes, interesting to document not only effects on poverty levels in a static framework, but also look at poverty dynamics. An important paper using a panel CASEN 1996-2001 (Contreras et al 2004) provide evidence of considerable churning in the income distribution, with a substantial fraction of households transitioning in and out of poverty using a subset of the CASEN survey linked in a panel with only two points in time (1996-2001). With overall poverty rates falling over time, vulnerability to uninsured risk, and vulnerability to poverty have dominate the social protection agenda. We will adopt the framework of Hojman and Kast (2008) who rank poverty profiles over time. Their method takes into account both transitions across different poverty status over time as well as poverty stocks at a given point in time to compare poverty paths. The poverty incidence is calculated by first averaging the household autonomous income per capita measures across the first two waves and the last two waves (being poor or not poor in 2003-4 and in 2006-7), in order to minimize concerns about measurement error. Tables 9E (appendix G) reports the effect of the program on poverty transitions. The results show a significant and negative effect on the probability of staying in poverty in both periods for rural households and households with heads with lower education. For these subgroups, the main effect of the program is to lift these groups permanently out of poverty, rather than smoothing their transitions in and out of poverty. In the framework of Hojman and Kast, the dynamic poverty path of the Chile Solidario participants, for the subgroups for whom we detect a significant effect, dominate the path of non-participants.

\[ f_D(poor(2003/4), poor(2006/7)) \]

More precisely, if you let \( f_D(poor(2003/4), poor(2006/7)) \) to be the probability of being poor or not poor in the first two periods and the two last periods, we estimate the impact of the program for participants (relative to no-participation): \( f_D(0, 0), f_D(0, 1), f_D(1, 0)f_D(1, 1) \).
5.2.6 Housing

Housing conditions constitute a very important dimension that program aims at improving. Housing and employment are the two dimensions that exhibit the highest unmet demands at entry: about two thirds of the families participating in the first two years of psychosocial support in 2003 are not complying with at least one minimum condition in the housing dimension (base Puente). In-depth trajectories of households from earlier cohorts, show that these two dimensions are also perceived as the most critical for long term improvement of family welfare and are harder to work with (Mideplan 2009). Having their own house, followed by the project of having a stable employment, are reported as the most frequent project expressed by participating households in the 'ficha de egreso' at the end of the two years of intensive psychosocial support of the program. The activation of families towards housing ownership for participating households has a symbolic value that goes beyond the material benefits associated with the living condition: qualitative work suggests that having a own place ('casa propria') is an important aspiration that helps project families towards the future.

Table 9 for administrative data provides differences-in-differences estimates that show an increase an improvement in housing conditions. The effects on house ownership or renting the house where family lives (panel A) are positive and increasing over time, ranging from 2-4% for one year effects to 3.5-7% for two year effects. There are no significant differences in the probability of having water supplied by public network, whereas participating households are more likely to have a sewage system connected to the network. Results from the panel Chile Solidario confirm the results found in the administrative data (table 8, Appendix G). The panel results also show significant gains in access to adequate sewage system, with gains on the overall sample, and relatively stronger effects in rural areas, for biparental and less educated households.

5.2.7 Psychosocial wellbeing

The impact on the program on the psychosocial variables is mixed, with both positive and negative results. The lack of consistent results is due in part to measurement issues, with some scales not consistently framed over time, and others where the scale have not been designed to pick up normally distributed outcomes. More work is needed in the future to provide robust guidance on scales that measure psychological well being and that adequately capture key gains observed in qualitative work.

Table 10D show negative results on psychosocial distress, and more so in 2007, but overall in a consistent way for different subgroups independently of whether it is measured as a full scale, the five item MHI-5 or the consistent measure over time. There are also some mild negative results on perceived social support from relatives (for more educated household heads and elderly) or from friends (among the young heads). The negative impact on distress and perceived support are not necessarily at odds with the intervention. As discussed more in detail in Appendix D, the poverty dynamics path for participants (first-order) stochastically dominates the path for non-participants if and only if three conditions apply (Hojman, Kast 2008): (i) the probability of always been non poor \( f^D(0,0) \) is equal or higher, (ii) the static poverty in later period is lower (i.e. \( f^D(0,0) + f^D(1,0) \) is equal or higher) and (iii) the probability of being always poor is lower (i.e. \( f^D(1,1) \) is equal or lower). Our results do find statistically significant and negative effects on \( f^D(1,1) \) for the subgroups of rural households and households with lower education, hence satisfying the three conditions for those subgroups.

We performed substantial sensitivity analysis with respect to having a balanced or unbalanced panel, to using full scales or scales that are consistently defined over time, and to different definition of the scale for those outcomes where the scale was substantially skewed to the left or to the right. The results are described in this section, and the full set of tables is available upon request.
instruments adopted for the evaluation of CHS aim at capturing perceived psychosocial distress, and not depression. A randomized trial on microcredit in South Africa showed mixed effects on mental health, by increasing the level of perceived stress (mainly for men), but reduced depressive symptoms (Fernald et al 2008). As the authors on the South African study note, while, on average, high levels of perceived stress are generally positively associated with depressive symptoms, even positive events could be perceived as stressful for some individuals.

The results on self-esteem and the domain specific self-efficacy are quite sensitive to the specification of the dependent variable. Overall, the results are suggestive of weak positive effect on self-esteem, and more consistent positive effects on the perceived self-efficacy in the employment domain.

The self-esteem results are in general positive only for the scale as framed in 2006, and more significant when looking at the probability of reporting the top score of the scale (for urban areas, female headed households and households with heads with incomplete primary education).

The program exhibits more robust effects on self-efficacy related to employment. The results are on average stronger in 2007 than in 2006, hold for both the full scale and the consistent scale over time, and do exhibit the largest effects when looking at the probability of reporting the top score of the scale. Participants improve their perceived ability to activate actions in the scenario of an unexpected job loss, with relatively stronger effects for households with heads with incomplete primary education, and heads aged 36-50.

The strongest and most consistent result across years and sub-groups refers to the significant effects of the program on their optimism and their ability to project themselves into the future. A handful of qualitative work\textsuperscript{24} shows that the visualizing and defining an explicit life project is a stepping stone to activate changes in attitudes and actions towards achieving goals that would help families exit extreme poverty.

5.2.8 Changes in family composition

The program operates in a setting of fluid family and household dynamics. The Chilean society has been marked by long term underlying societal change, common to other Latin American countries and well documented in the sociological literature\textsuperscript{25}. Data from the CASEN report a significant increase in female headship since the 1990s, with larger increases for poor and indigent families (with an increase of 10% relative to households in the better off quintile, 3%, MIDEPLAN 2007). Trends from the CASEN also show that the labor force participation of female-headed households has increased over time (MIDEPLAN 2007), but differentially less for female headed households in the lower quintile. Female headed households are more present in urban areas, have a higher incidence of poverty, and have been identified as a major vulnerable group using the new targeting instrument (FPS). Among program participants, qualitative work (MIDEPLAN 2009) identifies female headed households as a vulnerable group. Single headed households (among which female headed represent the majority) are among the groups with a relatively higher share of minimum conditions to be still met at the exit of the psychosocial support phase of Puente.

We will use the administrative data follow-up individuals (using the unique identifier over time), and document how the family and household structures change over time.\textsuperscript{26} We proceed with the

\textsuperscript{24}To cite a few, FLACSO (2005), FOSIS ( ), MIDEPLAN (2009).

\textsuperscript{25}Arriagada (2002) argues that the increase can be associated with increases in female educational attainment and labor force attachment, both of which would increase females outside options and bargaining power.

\textsuperscript{26}The panel Chile Solidario, on the contrary, follows households as determined by their residence, and collecting information about all household members at any given point in time, with no tracking for individuals or entire
analysis of family dynamics using the administrative data as it allows to track changes in role within family at the individual level as well as mobility between families: as long as an individual (and his family) remains in CAS/FPS datasets it is possible to trace all changes in his role within the family and test whether this dynamics is influenced by the program.\textsuperscript{27}

The analysis is has two main purposes. The first is to quantitatively assess the importance of those changes in headship that are likely to be associated with increased family vulnerability. Some other changes in the family structure are a natural part of the life cycle of families (marriage, household formation), and hence are not necessarily related to the impact of CHS. The second objective is to provide robustness to the results from the administrative data presented so far using administrative data are presented for the subset of families in households with the same household head over time. In this section, we will document the patterns of changes in family composition, with a specific focus on change of headship, and more importantly, we test whether these changes are by themselves affected by the program CHS.

Table 18, Appendix F provides a description of the incidence of changes in headship of households in the administrative data, together with some socio-economic correlates. About 8-9\% of the households in 2002 experience a change in the head of household within a three year window (2002-2005). A small proportion (1/10) of such changes is accounted for by the head changing their residence (within/across communes). Headship change is more common among younger families, in urban areas, and among female headed households (as documented by table 13 and figures 6). About half of the changes in headship are from female to male-headed families, largely described by families moving from single-headed to biparental households forming new unions or marrying. Changes that are more related to increased vulnerability are transitions from male- to female heads, which account for 20-30\% of the overall transitions, and among them those 1/3 are to single headed families.

We explore whether part of these differences among participants and non-participants are a causal effect of the program in table 14: younger program participants in 2002 are less likely to experience a change in headship as a result of having participated to CHS (panel A). The effect is increasing over time (12 per cent less likely to change headship by 2004 and 17\% less likely by 2005). When we disaggregate by looking at the four transitions separately (table 14, panel B), we can show that the participants are on average 6\% less likely to become single headed households. The overall effects apply to a small fraction of the target population (13\% of all families), but they are qualitatively important as they provide indirect evidence of the role of the psychosocial support and of the family dynamics as a key dimension of welfare that the social workers tackle in their meetings with the families.

5.3 Sensitivity analysis: Inference, Comparison DD and RD results

How do the different methodologies compare and what are the parameters we are estimating? In the administrative data, impact estimates from RD are estimated in a neighborhood of the endogenous cutoffs (a window of 20 CAS points above and below the relevant threshold), while DD results are estimated on the sample of eligible families, as defined by the endogenous cutoffs. To the extent that the impact estimates vary along the CAS distribution, then the results would be projected on different target populations. Moreover, all main results in the administrative data

\footnote{Appendix A provides a description on how links between families and individuals over time can be done using administrative data.}
will be presented for the sample of family heads for whom the identity of the family head does not change over time.

Table 16, Appendix F provides a summary comparison of the results when estimating the impact of the program on two sample outcomes (take-up of any subsidies and employment of the head or spouse), with sensitivity analysis for whether RD and DD estimates are drawn from comparable samples and assess the impact on estimates for restricting the analysis to families whose head was unchanged over time. Panel A shows that the results of RD and DD over the same CAS interval (in the window of -20/+20 points around the relevant cutoff) produces consistent results to the RD. However, it is harder to detect small effects with the RD (IV column) due to a problem of power. The RD estimates, due to a relatively small first stage, has standard errors which are of order of magnitude about ten times as large as those in the DD. The consistency of the results obtained from different empirical methods with different identification assumptions suggests that the extent of selection bias should not be important in the context of this program.

All the results we present for the administrative data are reported for families whose head does not change over time. Due to smaller sample size, the standard errors are slightly larger in restricted sample. Using a restricted sample of families with the same head over time we restrict ourselves to more stable families, that are probably more likely to present better behaviors and might be relatively easier to work with, so that the estimated effect is a upper bound of the CHS’ impact. But if they have more conditions filled at entry, the social worker may work on less dimensions and, therefore, the estimate we present is a lower bound of the effect. This can explain why in take-up of benefits the effect for stable families is smaller than it unconstrained sample (see panel B of table 16); but when we focus on employment of head we find similar results in both samples, suggesting that the two arguments above cancel out.

In the main results presented in paper we choose to focus on a stable sample of families to isolate the effects of changes in family composition that may affect the outcomes we analyze. As we discussed in the previous section, the only group where we find impact on changes in headship as a response to program is the young (head aged 18-35), and for those families there is really not substantial difference om the results between conditioning or not on having the same head over time (restricted vs unrestricted sample).²⁸

6 Conclusion

This paper examines how CHS is changing the lives of the poor in Chile. We focus on a limited but important set of outcomes, which are likely to be linked to the longer term welfare of participating families, namely employability, income, housing, and psycho-social welfare of household members. Our data comes from a survey collected especially for the purpose of evaluating CHS, and from administrative records which give us basic outcomes for the universe of individuals eligible for any social program in Chile.

In order to identify the impact the program on outcomes we start by relying on a regression discontinuity design, exploring the fact that eligibility into the program is determined by whether a household has a CAS score above or below the cutoff level of the municipality in which it is located, and that individuals located just below and just above each municipality’s cutoff are similar in all dimensions but one: eligibility to the program. Since this cutoff score varies across municipalities, it is possible to identify the impact of the program for a very large set of individuals.

²⁸We performed all the analysis presented also using the sample of all families and the results are qualitatively similar to those presented here.
who are induced to participate in the program just as their eligibility status changes (marginal individuals), and who are located around each of the discontinuities just mentioned.

Unfortunately, some of our estimates are imprecise. Therefore, we also produce difference in difference estimate which allow us to get more precise results. These estimates come from samples of eligible individuals, and are based on the assumption that, among those eligible, the trend in outcomes for non-participants in CHS is the same as the trend participants would experience had they not participated in the program.

Our main results are that the program increases the uptake of subsidies and of the employment programs provided by FOSIS (the only ones we were able to measure so far). These impacts are present for some but not all cohorts and length of exposure, but the overall pattern of impacts leads us to believe that these effects are stronger for later cohorts and that they are fairly robust. The RD estimates are larger than the DD estimates, at least when they are statistically significant, but the DD estimates are more stable across cohorts and years. These results indicate that CHS is successful in stimulating demand for these services, and also making supply available to respond to the additional demand.

The impacts of CHS vary across families with different characteristics, and located in different municipalities. For example, the impact of the program on the take up of subsidies is larger in municipalities with a better network of social services, for families served by social workers with relatively low caseloads, and in male headed families. Conversely, the impact of the program on employment of the spouse is larger in rural areas and for families served by social workers with relatively low caseload.

Against these positive gains, we were not able to detect any positive impacts of CS on employment or income of the head. While the scope for improvement for male heads were very small (as the totality of male headed families had been already been working in the absence of the program), the lack of results for female headed households is important to document, as they represent a sizable vulnerable group within the target population identified with the new targeting instrument. Employment response and income generation is more difficult for them, as they face more time constraints when combining family responsibilities and work commitments, as well have lower ability to diversify income sources and insure themselves against shocks.

The main channel driving significant effects in employment, income, poverty and indigence comes from the activation of the labor force of the spouse in biparental families. The result is notable in a country with an exceptionally low female labor force participation. Along this dimension, the results from the panel CHS mirror qualitatively the same results found in the administrative data: the spouse employment effects (and with them the income and poverty effects) are concentrated among rural households, and in families with lower educational attainment of the head.

Even though we cannot establish a causal link between the gains in the employment of the spouse and the participation to employment programs made available to the participants within the supply side response, we nonetheless provide suggestive evidence that the same subgroups for which we detect a positive employment effect are those who are also more likely to have received the employment programs.

Last but not least, we estimate that there is a significant impact of the program on family stability, with a lower probability of younger family heads to transition to single headed families. The results apply to a small fraction of participating families, but it is qualitatively important, as it highlights the important role of the dimension of the family dynamics during the intensive phase of the psychosocial support.
7 References

References


[28] Espigar (200X) ”Estudio diagnostico sobre las necesidades y barreras para la generacion de empleo en sectores pobres”, Santiago, Chile.


[36] FOSIS (2005b), ”Con su Esfuerzo y una Oportunidad, Historias de vida de familias que participan en el programa Puente”, Santiago, Chile.

[37] FOSIS (2007)


33


[68] Porter, Jack, 2003, ”Estimation in the Regression Discontinuity Model”, mimeo, Department of Economics, University of Wisconsin


[73] Radczynski, Dagmar, 2008, ”Sistema Chile Solidario y la Politica de Proteccion Social de Chile - lecciones del pasado y agenda para el futuro” - IFHC y CIEPLAN, Santiago, Chile.

[74] Ravallion, Martin, 2008. ”How relevant is targeting to the success of an antipoverty program ?”, forthcoming *World Bank Research Observer*


[80] Universidad Chile (200X) ”Trayectorias Laborales en Familias del Programa Puente”, Facultad de Ciencias Sociales, Santiago, Chile.
Appendix A: Description of Administrative data and data construction

The Ficha CAS and the CAS score

CAS score is a proxy means test that intends to capture some key socio-economic correlates of unsatisfied basic needs. The ficha CAS is used to compute the CAS score, used as an instrument for targeting most social programs in Chile since 1980. This instrument covers around 30% of the Chilean population and it includes 50 variables grouped into 9 categories. The index is used to determine eligibility to the following programs: a social pension (Pension Asistencial, for elderly poor and disabled), a family allowance (Subsidio Unico Familiar, SUF, for poor children), a school feeding program (Programa Alimentacion Escolar, for poor schooling-age children), Chile Solidario, public housing program (Programas de vivienda social), and a public water subsidy (Subsidio al Agua Potable, SAP).29

The CAS is a continuous index that results from a weighted average of underlying variables. The variables that enter the score have different weights and are concerned to four main areas: housing conditions (wall, floor, ceiling, overcrowding, water access, sewage, shower), property type, education of family members, occupation, income, and durables ownership (fridge, boiler, tv).

The Ficha considers the family as the unit of reference and this is defined as a group of persons that live together, whether or not are relatives, and who share some kind of income and auto-recognize themselves as a family. So different families living in the same house may have a different CAS-score as long as they have different characteristics of income, education and activity. However, the unit of application of this survey is the household, so each time someone or a family applies for a Ficha, the entire household will be surveyed. The questionnaire is filled by the head of family, and only under his/her authorization other member may fill the questionnaire.

The Ficha is valid for a period of two years, as long as families do not change their address. This is a survey that should be filled at family’s house and in order to attest the credibility of information provided 20% of all valid surveys are randomly chosen to be re-interviewed by a supervisor and all surveys with invalid entries are revised and if necessary households are re-interview (Ministry of Planning, 2003).30

Ficha CAS, by construction, does not intend to represent the Chilean population. An individual or family that intends to apply for a social program will do it at the office supplying the program or at the municipality. The CAS score obtained after filling the Ficha CAS will determine whether

29Some of the programs use CAS score to rank the applicants and serve those in more need, whereas other programs use CAS as one of the variables to be considered when determining eligibility status.

30Supervising a Ficha includes verifying if individuals surveyed provide correct information regarding income and family’s patrimony.
he satisfies or not the conditions to access the program. So our data set excludes all families who have not applied for any social benefit. However, it is important to notice that we do not necessarily need the whole population to do a proper evaluation. Indeed, the population of interest is the population of beneficiaries and potential beneficiaries of the program, and there was a strong effort on the part of the government to make sure that most of the poor did have a Ficha CAS when the program was implemented in 2002.

In any case, in order to assess the severity of the problem of sample selection we compute the distribution of families that applied to Ficha CAS in the nationally representative household survey CASEN in 2003 (Figure 8, Appendix G). Although CASEN 2003 does not contain families’ CAS it has enough information to produce a simulated version of the CAS score that we use to compare the coverage of Ficha CAS across the entire distribution of CAS. Although more than 60% of families with CAS in the first 5 ventiles have tried to obtain Ficha CAS, this coverage is always below 80% and, as expected, families less needy are less likely to have a Ficha.

The Ficha de Proteccion Social

In 2007 the instrument to select families into the program was replaced by the Ficha de Proteccion Social. This new targeting instrument aims at assessing the household income generating capacity and its vulnerability to shocks. This is a significant change from the CAS, which weighed heavily on assets and durables ownership, making it more persistent. The FPS considers the needs of different members in the household according to equivalence scales. The unit of reference is the family, but this is now defined as a household, that is, individuals that live together and share family expenditures.

As Ficha CAS, FPS has information on each family’s member date of birth, education, income and labor market participation, house ownership and its conditions. Ficha CAS contains information on participation on welfare programs and this allows us to measure effectiveness of Chile Solidario to help families taking these programs. FPS contains variables related with use of health facilities, school attendance by children, disability status of members and alcohol and drugs use of family members.

Constructing the administrative panel (Consolidado CAS and FPS)

The data we use is a panel formed using Ficha CAS and FPS that includes individuals surveyed between March 1998 and May 2008, on a total of almost 47 millions observations covering almost 12 millions individuals. This is a biennial panel because Ficha CAS is valid for two years, so for example, the CAS for 2004 contains individuals (families) that were surveyed between Jan. 2003 and December 2004. We use seven waves of data from Ficha CAS (2000 to 2006) and the only wave available for new Ficha de Proteccion Social, which spans from Jan. 2007 to May 2008. There is only one observation per each family in FPS.

Changes to the original sample are recorded in Table (A) below. We performed the following checks to each cross section of ”Consolidado CAS” and ”Ficha de Proteccion Social”:

- We drop repeated observations in 2000, 2001 and 2007\(^{31}\);\n
\(^{31}\)These repeated observations correspond at least to two identical rows of data
• We recode the individual identifier, RUT (Rol Unico Tributario) or RUN (Rol Unico Nacional), to missing if it is too small (1000 or less) and flag observations with the same identifier. We also verify whether individuals have valid identifier. This is important because the combination RUT-digito verificador allows us to merge the several waves of CAS Consolidado, FPS and these data with data from other sources. We consider that an individual possess a valid RUT if it fulfills several requirements: (i) if it is larger than 50,000, (ii) if the digito verificador is correctly assigned, and (iii) if it is not missing. Individuals with invalid or missing RUT tend to have lower income, less years of education, to be in families with lower CAS and in larger families, are less likely to be head of family and to be younger than 18;

• We check if two individuals with the same combination RUT-digito verificador are the same person. Two individuals surveyed in the same year with the same RUT, digito verificador, gender, date of birth, region, province and municipality of residence, number of survey, relationship to head of family, name and surname and CAS are considered the same person, so we keep only one observation per year;

• As CAS index is assigned to the family, we dropped families with CAS varying within family;

• We found a few observations of heads of family whose parents or grandparents are younger than the head (on average 1500 out of 6 millions individuals per wave), which we flag but do not exclude from data given the small proportion of cases.

All income related variables are top coded at the 99th percentile and all income values are deflated to May 2008 using the monthly CPI (Banco Central de Chile, 2008). We have some concerns regarding the quality of income data in 2006: for 179394 observations (35% out of 506051 nonmissing observations) the period of income reported is 0, which is an unassigned code.

We further restrict our analysis to municipalities that offered Chile Solidario, and thus with families in Puente data set and to all families with a valid Ficha CAS or FPS. The analysis is restricted to families with one head (0.9 percent of families report zero or two heads) and with heads without missing information on gender and date of birth.

We focus on families with non-missing values for a large set of variables included in the computation of CAS score. These variables are: type of water and energy supply, sewage, municipality of residence, information about participation on welfare programs, employment status of head, information non-missing on family income (computed as the sum of the income of all its members or imputed by estimated value of consumption if family depends on others’ help), house ownership, education of head and information on some basic appliances (refrigerator and heater).

In order to properly compare some variables in Ficha CAS and FPS we need to perform some adjustments. In Ficha CAS information on income and occupation of head are only asked to those

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32 The national identification number in Chile is the RUT (Rol Unico Tributario); sometimes it is called RUN (Rol Unico Nacional). It is used as a national identification number, tax payer number, social insurance number, passport number, driver’s license number, for employment, etc., and it is this identifier that allows us to merge the several administrative data sets used in the paper. Since year 2004 every born baby has a RUT number; before it was assigned at the moment of applying to get the ID card. Hence each individual in the data set is identified by a unique combination of RUT and digito verificador. The digito verificador is either a letter or number that is assigned to each RUT by an algorithm that ensures the authenticity of RUT.

33 An individual without documents can be identified by a missing RUT and a digito 1 in Ficha CAS or an entry of RUT equal to date of birth in FPS. Foreign individuals have RUN 1 in FPS (Ministry of Planning, 2003, 2007).

34 As of October 2008, Chile is divided in 15 administrative regions (2 new regions were created in created in October 2007), divided into 346 municipalities. Chile Solidario has been administrated so far in 336 municipalities.
age 14 or above. In FPS information about labor market variables and income are only available for those 15 or older. Thus we restrict our analysis to families with heads 15 or older.

Given the number of repeated and invalid RUTs documented in Table (A) we construct an individual unique identifier to merge together the several waves of Ficha CAS and FPS. We tried several possible definitions using individual characteristics that are constant in time and end up using as individual ID a combination of RUT-digito verificador, individual’s gender and date of birth. The sample of individuals we are left with is described in Table (A).

The unit of treatment of Chile Solidario is the family, however following families units over time using Ficha CAS and FPS has the shortcoming of family ID provided being linked to family address. Therefore, our main sample is composed of individuals (and their families) who were heads of families at the year of potential entry in program\(^{35}\). We proceed this way for two reasons: (1) as mentioned, family and household identification number is linked to physical address of residence in CAS, (2) family identification number is different in Ficha CAS and FPS, whereas the individuals identification number is unique - the Chilean identification number discussed above, RUT/RUN.\(^{36}\). Our choice enables us to detect if heads of family change their role within the same family or if they move to other family, either assuming headship or as other family member. We test whether changes in family role of head between the baseline (ie, year at which eligibility is measured: 2002 or 2003) and 2004 or 2005 are related to program and we find that only heads of family 18-35 years old eligible in 2002 are less likely to have changed their status with respect to non-eligible (therefore, program participation is in general not related to changes in role of head). The sample used in this version of the paper restricts analysis to those heads who kept the same role between baseline year and year of interest of analysis.

Description of variables used from Ficha CAS and Ficha de Proteccion Social

Labor Market Outcomes

- Employment status of head and spouse.

Definition of employment status in Ficha CAS and in FPS are slightly different. In Ficha CAS there is no direct question on whether individuals have an activity from which they subsist and on whether individuals have already worked (and are, thus, part of active population). We infer about employment status using the following information on activities undertaken by individuals: (1) trabajador familiar no remunerado (non remunerated worker working on a family business, for example, an individual who workers on family’s hairdresser, in crafts activities, etc.), (2) trabajador por cuenta propia (independent worker; this category also includes individuals with income from properties or interest); (3) trabajador dependiente urbano (dependent urban worker), (4) as-salariado agricola (farm worker, that is, individuals that permanently work in a farm receiving monthly income), (5) pequeno produtor agricola (small farmer), (6) empleado del sector publico o particular equivalente (public servant or equivalent private sector), (7) other activity (mainly medium or large farmers and entrepreneurs), (8) jubilado, pensionado o montepiado (respectively, retired or individuals that depend on others help, excluding relatives or public subsidies, and widows or orphans that receive a transfer on behalf of deceased person), (9) individuals without any

\(^{35}\)For example, when we evaluate the effect of entry in 2002 on outcomes in 2005 we consider family and individual outcomes for those individuals who were heads of family in 2002.

\(^{36}\)Our approach has the advantage of allowing to merge Ficha CAS and FPS.
activity (includes individuals that have never entered the labor force or individuals who have been unemployed for more than three months). We define as employed an individual with any activity between (1) and (7), otherwise the individual is considered unemployed. Given the impossibility to distinguish between unemployed workers and those that never enter the labor force, in practice, our definition compares employed versus inactive individuals.

In contrast, in FPS there is information on whether an individual is working, if he worked in the last 30 days and if he ever worked (being part of active population). We define as employed an active individual that is working at moment of survey or that worked in the previous 30 days.

Income

- Family total and per capita monthly income.
- Monthly income of head and spouse.

In Ficha CAS this variable includes autonomous income (net labor income, rents, excluding Pensiones Asistenciales, Subsidio de Cesantía, Becas (scholarships), Subsidio de Agua Potable and Subsidio Unico Familiar). As surveys cannot have missing information regarding family income some imputations procedures are used if individuals have income from intermittent sources or if family depends on others help. For self-employed workers whose income is variables or intermittent income is estimated by average monthly family expenditures in food, cloth, house maintenance, education, transports, amenities, etc. For families without income living on help of other income is imputed by converting into pesos the amount of help received\(^{37}\).

In FPS there are three measures of annual income from different sources: (i) labor income, which for independent workers is the difference between the price received by the product of their work and its production cost, (ii) \textit{ingresos de jubilaciones o pensiones} (pensions) and (iii) other income (which includes bonuses, in-kind payments, consumption from own production, rents, transfers from non-family members and unemployment subsidy; this category also includes all income used for family subsistence without any clarification about whether subsidies are included or not\(^{38}\)).

We define family income as the sum of income from all sources and individuals in family.

Housing Conditions

- Indicator for type of water supply (1 if public).

- From Ficha CAS we construct indicators for whether the house has: (i) fridge, (ii) heater, (iii) WC (shared with other houses/not), (iv) shower, (v) if house has exclusive use of sewage (vi) electricity meter, (vii) colors tv, (viii) if family lives in own or rented house (legal occupation of place).

Subsidies

- At least one family member receives public subsidies: cesantia (unemployment compensation)/PASIS/SUF/SAP;

\(^{37}\)In data it is possible to identify a person without income that depends on others’ help as someone with activity coded as \textit{Jubilado, Pensionado o Montepiado} and with income imputed.

\(^{38}\)See page 78 (Mideplan, 2007)
• Family receives SUF, conditioning in categorical eligibility status. We define a family as (categorical) eligible for SUF if (i) there are children under age 6 in family, (ii) children between age 6-17 are enrolled in school, (ii) and are not receiving PASIS.

• Family receives PASIS, conditioning in categorical eligibility status. We define a family as being eligible to PASIS if there are individuals over 65 that are not receiving any pension.

Family structure and fertility

• Presence of children less then 4 years old in family.

• Number of children (less than 18 years old) in family.

• Change in role for individual who was head of family at the baseline (only for samples where we allow for change in headship).

Merging Administrative Data and Panel Chile Solidario

For each household in Panel Chile Solidario we try to retrieve information about CAS score by merging Panel with CAS and Ficha de Proteccion Social using RUT. Table 1 in Appendix G provides information on the number of households that were found in Administrative data. If a household has multiple families, given that CAS is set at family level and that survey panel is designed at the household level we impute CAS for a given year for a given household as the minimum CAS found for any of families that comprise the household.

Appendix B: Representativeness of the panel sample Chile Solidario

Re-weighting survey data using Ficha CAS

The panel Chile Solidario was originally designed so that the method of matching could be used for evaluating the program. Therefore, the sample is not representative of the population, since it surveys program participants in 2002 and 2003, and non-participants that are similar to participants among some observable dimensions. Since then we have changed the main method in this study to be regression discontinuity. However, for it to be possible to draw useful lessons from this methodology, it is important that the data is representative of the population around each participation cutoff, and that the proportion of the sample in each cutoff mimics what we observe in the population (especially when the sample or the population or both are not uniformly distributed across cutoffs). If this is not the case, we risk estimating impacts that are representative for the sample, but not for the population. One way to address this representativeness problem is to use sample weights, which can be constructed.

We use weights to make survey more representative of population: of those families with CAS (that can be invited to program).

As explained previously (Appendix A) CAS score is score that summarize a set of household characteristics and is the mechanism used to select families into program. Families entrants in 2002 and 2003 were those families surveyed by the nationally representative household survey, CASEN.
2003, whereas controls were chosen in stratified way by geographic region and by urban/rural areas.  

We construct several weights and analyze their performance by comparing first stage regressions estimated in administrative and in survey data for different samples and by visually inspecting the distributions of participants and nonparticipants around the cutoff in administrative data and in weighted and unweighted survey data.

The weights are computed as follows. Let the number of households in the population (that is, with Ficha CAS) with $CAS = \overline{cas}$ in year $t$, $t = \{2002, 2003, 2004, 2005\}$, living in region $r$ in a urban or rural area $u$ with entry status in CS $p$, $p = \{0, 1\}$, be denoted by $N(CAS = \overline{cas}, t, r, u, p)$. Let the number of households in survey data with $CAS = \overline{cas}$ in year $t$, $t = \{2002, 2003, 2004, 2005\}$, living in region $r$ in a urban or rural area $u$ with entry status in CS $p$, $p = \{0, 1\}$, be denoted by $n(CAS = \overline{cas}, t, r, u, p)$. We weight the data by the inverse of the probability that an observation is included in data due to the sampling design:

$$weight = \frac{N(CAS = \overline{cas}, t, r, u, p)}{n(CAS = \overline{cas}, t, r, u, p)}$$

CAS is a continuous score but to avoid defining fine cells and add extra instability to our estimates we round CAS to its closest integer to compute the weights.

We have experimented with the following set of weights:

1. weights defined by cell $(CAS = \overline{cas}, t, r, u, p)$ on the entire Ficha CAS of year $t$;

2. weights defined by cell $(CAS = \overline{cas}, t, r, u, p)$ on the entire Ficha CAS of year $t$ excluding entrants in previous years from definition of each cell;

3. estimate the propensity score of participation separately for four broad geographic areas, including as covariates household size and age composition, head characteristics (age dummies, education dummies, marital status dummies, labor force history participation), housing characteristics, asset indicators, household income per capita, a rural indicator and dummies for the regions, and interactions between region indicators and rural. We compute weights defined by cell $(CAS = \overline{cas}, t, r, u, p)$ on the common support of estimated propensity score of participation into program;

4. as survey oversamples controls and these were forced to have applied to "Ficha CAS" between November 2001 and October 2003 we construct sampling weights for 2004(2005) cohort using those households with a Ficha CAS in 2004(2005) and in 2002 or 2003;

39 The matched comparison group in Panel Chile Solidario was constructed by estimating a propensity score of participation into the program separately for four broad geographic areas. The matching was done among households who reported having filled in a ficha CAS and was done choosing the 3 nearest neighbors for each beneficiary within each geographic area. Comparison households were forced to be chosen within the same geographic area and zone (rural/urban) for practical convenience.

40 See Deaton, 1997

41 CAS score is defined by family, therefore if a household is contains multiple families the score assigned to each family may varying if income, education and labor market scores of different families vary. Panel Chile Solidario was primarily designed to follow households over time therefore we assign to each household in Ficha CAS the score of the family presenting the lowest CAS (this will be the first score to drive household’s eligibility status for welfare programs).

42 This weight tries to recover families in the common support of propensity score of participation.
5. we also experimented using the weights defined by distance to endogenous cutoff and obtained first stage estimates and distribution of observation similar to those obtained by with weighted defined by (1) and (2).

All approaches result in similar estimates of take-up around the threshold, but we opted to choose families in the region of common support for propensity score of participation (option 3).

Appendix C: Algorithm used to find discontinuity in participation

For each municipality \( j \) and year \( t \) (2002 to 2006), we estimate:

\[
D_{ijt} = \alpha + \beta E_{ijt}^g + \varepsilon_{ijt}
\]  

(3)

where \( D_{ijt} \) is an indicator that takes value 1 if family \( i \) residing in municipality \( j \) enters in the program in year \( t \) and 0 otherwise (entrants in future cohorts are thus part of the control group, whereas we exclude families already in the program to find the CAS cutoff as by definition they are not part of the group of possible families to be invite) and \( E_{ijt}^g \) is an indicator that takes value 1 if the family is eligible to participate in Chile Solidario: \( E_{ijt}^g = 1 [CAS_{ijt} \leq CAS_{jt}^g] \). \( CAS_{jt}^g \) will be all value that CAS may take within a fine grid in municipality \( j \) between \([CAS_{ijt}^{\min} + 20, CAS_{ijt}^{\max} - 20]\).

We find the value of \( CAS_{jt}^g \) for each municipality \( j \) that is the threshold such that there is a discontinuity in participation through the following algorithm:

1. Initialize the \( R^2, \bar{R}^2 = 0 \).

2. Let \( CAS_{jt}^g = CAS_{ijt}^{\min} + 20 \) be the first point of the grid. We define \( E = 1 [CAS_{ijt} \leq CAS_{jt}^g] \) and run OLS regressions of \( CS_{ijt} \) on \( E_{ijt}^1 \), according to the model above. We save the \( R^2 \) of this regression, \( R^2_1 \). If \( R^2_1 > 0 \), than \( \bar{R}^2 = R^2_1 \) and \( CAS_{jt}^g = CAS_{jt}^1 \).

3. We redefine the eligibility threshold. The new cutoff is the second point in the grid, \( CAS_{jt}^g = CAS_{jt}^1 + 2 \). We redefine the eligibility indicator: \( E_{fjm} = 1 [CAS_{ijt} \leq CAS_{jt}^g] \). With this new threshold in hand we run OLS regressions of \( CS_{fjm} \) on \( E_{fjm}^2 \) and store the \( R^2 \) of this regression, \( R^2_2 \). We compare \( R^2_2 \) with the previous estimate: if \( R^2_2 > \bar{R}^2 \), than \( \bar{R}^2 = R^2_2 \) and \( CAS_{jt}^g = CAS_{jt}^2 \).

4. Repeat step 3 for all points in the municipality’s grid.

With this method the empirical threshold for municipality \( j \) in cohort \( t \) is the \( CAS_{jt}^g \) that corresponds to the largest estimate of \( R^2 \).