Risk–sharing in Rural Mexico*

Rodrigo Garcia–Verdu

May 31, 2000

Abstract

This paper presents evidence on the ability of households in rural Mexico to insure consumption against idiosyncratic risks. Using longitudinal data from Progresa, a poverty alleviation program targeted to rural households, we test the full insurance model. Furthermore, by exploiting the unique experimental design of Progresa, we analyze the effects of the program on preexisting risk sharing arrangements. Although we reject the hypothesis of full insurance, our results suggest there is risk sharing in these rural communities. No evidence is found that Progresa displaces preexisting risk sharing arrangements.

* Preliminary and incomplete. Comments welcome. E-mail: rgarciav@midway.uchicago.edu

1. Introduction

In the developing world, large fluctuations in income are as problematic as the low levels of per capita income that characterize most countries. Risk is more prevalent throughout low- and middle-income countries for two related reasons. First, the share of agriculture in total output is higher in low- and middle-income countries, although the share in most countries shows a downward trend. Since the agricultural sector is more vulnerable to risk than the manufacturing and services sectors, developed countries, where services account for most of output, are relatively insulated from such risks. Second, unlike high-income countries, low- and middle income countries lack well developed financial systems which allow individuals to insure themselves and limit their exposure to risk. This does not imply, however, that households in poor countries have no way to manage risks. As shown by Townsend (1994), even extremely poor villages in rural India may have informal risk-sharing mechanisms that allow them to come close to an optimal allocation of risk bearing. Unfortunately, the paucity of the data needed to test the empirical implications of the theory of optimal risk bearing has limited the number of studies available for other countries.

The objective of this paper is twofold. First, to contribute to the empirical lit-

erature on risk sharing by providing evidence on the ability of households in rural Mexico to insure consumption against idiosyncratic shocks. For this purpose we use household survey data from Progresa, a poverty alleviation program targeted to households in rural Mexico. Second, to contribute to the social program evaluation literature by evaluating the effects of Progresa on the degree of informal risk sharing. In particular, we are interested in analyzing whether the introduction of this program has displaced the preexisting risk-sharing arrangements. In a related paper, Attanasio and Rios-Rull (1999) have analyzed the potential disruptive effects of national insurance programs on preexisting informal risk-sharing arrangements. They have shown numerically that in a model of risk sharing under limited commitment the introduction of a government insurance scheme can actually decrease welfare. The intuition for their result is that, by decreasing fluctuations in aggregate output, a national insurance scheme increases the value of autarky and can crowd out preexisting informal risk-sharing arrangements. Using data from Progresa, they find that inter household transfers are smaller for households who participate in the program than transfers to similar household who were randomized out of the program. As emphasized by Townsend (1994, 1996), the general equilibrium framework we use in this paper avoids the pitfalls of focusing on a particular mechanism, in their case transfers, at the expense of

other risk-sharing mechanisms.

The rest of the paper is organized as follows. The next section presents an overview of the risks faced by villages and households in rural Mexico and the mechanisms they have to cope with them. Section 3 reviews the theory of optimal risk bearing. Section 4 contains the empirical results. Section 5 presents the conclusions and suggestions for future research. An appendix provides a detailed description of Progresa.

2. The Extent of Risk and the Scope for Insurance

This section provides an overview of the types of risks faced by the villages and households in rural Mexico, the impact of these risks, and the mechanisms they have to cope with them. Following Townsend (1995), we focus our attention on the existence of institutions which may offer implicit or explicit insurance, the markets or technologies available to manage risk, and on how insurable are the various risks. For this purpose we use data from two surveys carried out during November 1998 in the Mexican states of Guerrero, Hidalgo, Michoacan, Puebla, Queretaro, San Luis Potosi, and Veracruz.

We first analyze risk and insurance at the village level using the Locality Questionnaire of the Household Evaluation Survey (ENCEL 98: Encuesta de Evalua-

cion de los Hogares 1998, Cuestionario de Localidad), a community survey of 506 rural villages. It contains information on village characteristics in the six month period prior to the date of the survey as reported by one or more of the local representatives (e.g. local government official, school principal, etc.). The statistics on the availability of basic services in these communities illustrates their degree of poverty:

Table 1: Availability of Public Goods

Type of Public Good	Percentage of Communities Reporting Availability of Public Good
Electricity	67.6
Sewage	11.5
Public Phone	29.6
Drinking Water	8.7
Garbage Disposal	2.0
Post Office	1.4

Source: ENCELO 98, Cuestionario de Localidad

According to this community survey, over 94% of the communities reported agriculture as their main economic activity, with almost 85% of communities reporting corn as their main crop. This concentration of households in certain

occupations and the concentration of agricultural activity in certain crops limits the possibility of village-level insurance, and may be an impediment to efficient risk sharing. These rural communities are exposed a high degree of risk, as measured by the percentage of shocks they experienced in the six-month period prior to the date of the survey. Out of the 506 communities, more than 82% experienced some form of shock during this period, with the most common shocks reported being as follows:

Table 2: Shocks Experienced	
Type of Shock	Percentage of Communities Reporting Having Experienced Shock During the Last 6 Months
Droughts	70.8
Plagues	35.4
Fires	15.0
Frost	10.5
Floods	9.1
Hurricanes	4.2
Earthquakes	1.2
Other	1.2
None	17.4

Source: ENCELO 98, Cuestionario de Localidad

It is not possible from the data available in this survey to determine the magnitude or frequency of these shocks, or how aggregate or idiosyncratic were the shocks. The most important impact of these shocks as reported by the community representatives were:

Table 3: Most Common Impact	
Type of Impact	Percentage of Communities Reporting Impact
Loss of Crops	74.7
Increase in the Prices of Basic Goods	21.3
Scarcity of Basic Goods	20.4
Loss of Lands for Cultivation	16.8
Increase in Input Prices	13.2
Loss of Dwelling	2.6
Other	7.1

Source: ENCELO 98, Cuestionario de Localidad

When asked in the survey whether communities had some form of support to attenuate the effects of these shocks, roughly 75% of those interviewed responded they didn't receive any form of support. As to the forms of the support received, if any, survey responses were as follows:

Table 4: Forms of Support	
Type of Support	Percentage of Communities Reporting Receiving Support
Money	1.8
Food	1.4
Construction Materials	0.2
Medicines	0.2
Other	4.0

Source: ENCELO 98, Cuestionario de Localidad

The survey provides further information on the existence of institutions, such as production, credit, and consumption cooperatives which may help individuals insure against some of these shocks. According to the survey, the most common institutions present in the village are:

Table 5: Institutions	
Type of Institution	Percentage of Communities Reporting Having Institution
Communal Organizations	88.9
School Parents Organizations	86.4
Religious Organizations	37.9
Political Organizations	11.1
Non-Governmental Organizations	3.0
Production Cooperatives	2.4
Consumption Cooperatives	1.0
Credit Cooperatives	0.6
Other	1.4

Source: ENCELO 98, Cuestionario de Localidad

As shown in the data, institutions specifically designed to share risks are mostly absent: the share of communities reporting production, consumption, or credit cooperatives is very small. Furthermore, almost 95% of the communities reported having no facilities available for storing output. Nevertheless, there are other institutions whose main purpose is not providing insurance but may deliver occasional

relief (e.g., religious, political, and communal organizations). Overall, the picture that emerges from the data is that of very poor, high-risk agrarian communities with very limited access to formal insurance institutions or technologies.

3. The Theory of Optimal Risk Bearing

The theory of the optimal allocation of risk bearing originates with Wilson's (1968) work on syndicate theory, which is an extension of the competitive general equilibrium model of Arrow and Debreu. A syndicate is a group of individuals who jointly own a lottery and must make a decision under uncertainty on how to allocate its outcome among its members. This definition of a syndicate has been interpreted to include households in village economies, and the theory has been used as the benchmark to evaluate risk sharing since it yields testable implications on the way household consumption should commove with household income and aggregate consumption. We next describe the model in detail, following the exposition in Kreps (1990) and Townsend (1993), in order to provide the justification for the empirical specification used.

Time is discrete and indexed by t, where $t = 0, 1, ...$ At each date t the economy is subject to a random shock, which we index by ε_t. The shock ε_t can take on a finite number of values, $\varepsilon_t \in \{s_1, ..., s_n\}$. We denote the history of these shocks up

to and including period t as e^t, so $e^t = \{\varepsilon_1, \varepsilon_2, ..., \varepsilon_t\}$, and the probability of each of these histories as $p(e^t)$, so $p(e^t) = prob(\varepsilon_1, \varepsilon_2, ..., \varepsilon_t)$. There is a single consumption good in this economy, but following the convention of Arrow and Debreu, goods in different dates and states of the world are analytically different goods. Thus, goods are indexed by e^t, the date and state of the world in which they become available. The economy is composed of J villages indexed by j, $j = 1, ..., J$. Each village is populated by I households, indexed by i, $i = 1, ..., I$. Each household i lives for T periods, and is described by a von Neuman-Morgenstern expected utility function $E_0\left\{U^i[\{c_t^i(e^t)\}_{t=1}^T]\right\}$ and a stream of endowment income $\{y_t^i(e^t)\}_{t=1}^T$. We further assume the utility function is additively separable over time.

The planning problem that determines the optimal allocation of consumption among village members is:

$$\max_{\left\{\{c_t^i(e^t)\}_{t=1}^T\right\}_{i=1}^I} \sum_{i=1}^I \lambda_i \left\{\sum_{t=1}^T \beta^t \sum_{e^t} p(e^t) u[c_t^i(e^t)]\right\}$$

$$\begin{aligned} s.t. \qquad \bar{c}_t(e^t) &= \sum_{i=1}^I c_t^i(e^t) \leq \sum_{i=1}^I y_t^i(e^t) = \bar{y}_t(e^t) \qquad \text{for all } e^t \qquad (\mu(e^t)) \\ c_t^i(e^t) &\geq 0 \qquad \text{for all } i, \text{ for all } e^t \end{aligned}$$

where λ_i is the Pareto weight associated with household i, where $0 \leq \lambda_i \leq 1$ for all i, and $\sum_{i=1}^{I} = 1$, β is the discount factor, $0 < \beta < 1$, $u[\cdot]$ is a concave, twice continuously-differentiable period utility function, and $\bar{c}_t(e^t)$ and $\bar{y}_t(e^t)$ are aggregate consumption and income respectively. Assuming an interior solution, the first-order conditions for this planning problem are:

$$\lambda_i p(e^t)\beta^t u'[c_t^i(e^t)] = \mu(e^t) \qquad \text{for all } i, \text{ for all } e^t$$

where $\mu(e^t)$ is the Lagrange multiplier associated with the feasibility or adding up constraint.

Assuming common discount factor and expectations across households, the first-order conditions above can be rewritten as:

$$\lambda_i u'[c_t^i(e^t)] = \lambda_j u'[c_t^j(e^t)] \qquad \text{for all } i, j, \text{ for all } e^t$$

This equation together with the resource constraint yield a sharing rule for household consumption that is independent of aggregate consumption, $\sum_{i=1}^{I} c_t^i(e^t)$, and independent of the date t and history e^t. Thus, household consumption varies positively with aggregate consumption, $\sum_{i=1}^{I} c_t^i(e^t)$, but does not commoves with

household income, y_t^i (see Kreps (1990) or Townsend for proof of these claims). This is, under an optimal allocation of risk bearing households would be completely insured against idiosyncratic risk but not against aggregate risk. This result is the main empirical implication of the optimal risk-sharing model, and the one we will use to specify the empirical model.

4. Estimation

4.1. Description of the Data

Household survey data from Progresa are among the most comprehensive data on rural households in Latin America. They are comparable in terms of sample sizes and comprehensiveness to household survey data like RAND's Family Life Surveys in Indonesia and Malaysia, or the World Bank's Livings Standards Surveys. The surveys provide information on demographic characteristics of the household, including family size and composition, budget data, including household's expenditures, income, transfers, loans, and wealth, as well as information on health, nutrition, and education, the three components of the program.

One of the most innovative characteristics of Progresa is its experimental design: once the selection of eligible households within the communities took place,

communities were chosen randomly to participate into the program. Thus, randomization took place at the village level and not at the household level within villages. Since the surveys from Progresa were designed with program evaluation in mind, data on participants and non-participants were collected both for the treatment and control communities. The sample contains data on 320 treatment and 186 control communities. There were 14,856 households in the treatment group, out of which 7,649 were classified as living in extreme poverty and were selected into the program. There were 9,221 families in the control group, out of which 4,682 were classified as living in extreme poverty but were not included in the program (although they were eligible to participate in subsequent stages of the program). Before the beginning of the program the treatment and control groups were observationally identical. In particular, Behrman and Todd (1999) have shown that the distributions of household observable characteristics are not statistically different between treatment and control groups prior to the beginning of the program. Thus, any difference after the program started can attributed to participation in the program.

The focus of this paper is on household consumption, and how it commoves with household income and village-level aggregate consumption. In order to construct these measures we use two rounds of the Household Questionnaire of the

Household Evaluation Survey, a panel of 25,846 households or 138,540 individuals surveyed every six months. Although there are now four rounds of evaluation available, we focus attention on the first two rounds [1]. The first round of the survey was carried out in November 1998, approximately six months after the program started, while the second round was carried out in June 1999, approximately one year after the program started. In order to take into account the inflation in the intervening period, we deflate all consumption and income variables using the consumer price index.[2]

The primary sampling unit of this survey is the household, where a household is defined as a group of people living in the same dwelling, whether linked by kinship or not, who share living expenses and prepare food in the same kitchen. Since the original intention of the survey designers when including a section on consumption was to evaluate the nutritional component of the program, the surveys contain detailed information on expenditures in several commodity groups, including food, transportation, personal and household hygiene, clothing, education, health, and durable goods. Depending on the category, the surveys ask the respondent about

[1] Encuesta de Evaluacion de los Hogares, Octubre 1998, Cuestionario del Hogar (ENCEL 98O), and Encuesta de Evaluacion de los Hogares, Marzo 1999, Cuestionario del Hogar (ENCEL 99M).

[2] Indice nacional de precios al consumidor (INPC), Banco de Mexico. According to this index, the inflation during the period November 1998 and June 1999 was 9.78%. The base year used to calculate this index was 1994.

household expenditures made during the week, month, semester, or year prior to the date of the survey. In order to construct our measure of household consumption, we first convert all expenditures on nondurables consumption goods into weekly expenditures and then add up across the different categories. To takes into account the changing age and sex composition of the different households, we use the weights of the Adult Equivalent Scale proposed by the Mexican National Institute of Nutrition.[3]

We build our measure of household income by adding up self-reported income from the following sources: wage income and benefits from primary occupation, wage income from secondary occupation, income from self-employment (income minus expenditures from businesses or income generating activities), income from pensions, income from interests accrued, income from community profits, income from welfare programs, and income from rental of land, animals or machinery. (The only source of income included in the survey but left out from our measure of income is income from transfers.) In each case, the survey asks the respondent to report the income of each household member from the various sources. This

[3]Escala de adulto equivalente, Instituto Nacional de la Nutricion. The weights assigned to the different age-sex groups are: (i) for children: 0.41 for ages 0-4, and 0.8 for ages 5-10; (ii) for females: 1.05 for ages 11-19, 0.92 for ages 20-34, 0.85 for ages 35-54, and 0.78 for ages 55 and older; and (iii) for males: 1.15 for ages 11-14, 1.38 for ages 15-19, 1.26 for ages 20-34, 1.15 for ages 35-54, and 1.03 for ages 55 and older.

comprehensive measure of income tries to avoid the problem that many respondents report zero income is they are not employed in the formal sector. Since the respondent can report the income in days, weeks, months, etc., we first convert all reported income into weekly income. For this purpose, we use information contained in the survey on the number of days worked last week.

Regarding idiosyncratic shocks, the survey contains data on three classes of shocks: (a) shocks experienced at the household level in the six months prior to the date of the survey (droughts, floods, frosts, fires, plagues, earthquakes, and hurricanes); (b) sickness shocks experienced by any members of the household in the four weeks prior to the date of the survey, including the number of days the disease lasted and whether it resulted in any absence from work; (c) shocks experienced by household members ages 8 and above that resulted in temporary or permanent separation for work in the week prior to the date of the survey. We construct separate dummy variables for each of the three classes of shocks experienced in the period between the two surveys.

4.2. Empirical Specification

The theory of optimal risk bearing has been tested using data both from developed countries, such as Cochrane (1991) and Mace (1991) for the US, as well

as from developing countries, such as Townsend (1993) for India. In particular, Cochrane (1991) used annual data on household food consumption from the Panel Study of Income Dynamics for the period 1980-1983. He regressed changes in consumption onto a constant and different measures of idiosyncratic shocks, including household income and employment status. His results rejected the full insurance hypothesis for some but not all of the different shocks. Similarly, Mace (1991) used annual data on household consumption from the Consumer Expenditure Survey for the period 1980-1983. She regresses changes in consumption onto changes in aggregate consumption, changes in household income, and changes in employment status. Her results present conflicting evidence on the existence of full insurance, depending on the specification used (exponential utility vs. power utility). Townsend (1993) used annual data on household income and calculated consumption as a residual for three villages in rural India surveyed by International Crop Research Institute for the Semi-arid Tropics. Although he rejected the full insurance hypothesis, he found a remarkable amount of risk sharing going on among village members.

Following the previous literature, we use the following benchmark specification to test the hypothesis of optimal risk sharing:

$$\left(\frac{\ln c_t^i - \ln c_{t-\tau}^i}{t-\tau}\right) = \beta_1 \left(\frac{\ln \bar{c}_t^j - \ln \bar{c}_{t-\tau}^j}{t-\tau}\right) + \beta_2 \left(\frac{\ln y_t^i - \ln y_{t-\tau}^i}{t-\tau}\right) + \delta x_{t,\tau}^i + \epsilon_{t,\tau}^i$$

where c_t^i is household $i's$ consumption in period t, $\bar{c}_t^j$ is village $j's$ aggregate consumption in period t, y_t^i is household $i's$ income in period t, $x_{t,\tau}^i$ is an indicator function for any idiosyncratic shock experienced by household i between periods t and $t-\tau$, and $\epsilon_{t,\tau}^i$ is the error term assumed to be independent of all regressors. Under full insurance consumption should commove with aggregate consumption and be independent of household income, so theory predicts that $\hat{\beta}_1 \cong 1, \hat{\beta}_2 \cong 0$, and $\hat{\delta} \cong 0$.

The results of estimating this first regression by ordinary least squares (OLS) are as follows:

Table 6	
Dependent variable: change in log consumption	
Regressor	Coefficient Estimate
$(\ln y_t^i - \ln y_{t-\tau}^i)$	0.480
	(0.006)
$(\ln \bar{c}_t^j - \ln \bar{c}_{t-\tau}^j)$	1.802
	(0.003)
	$R^2 = 0.572$
	$N = 11,363$

Standard errors in parentheses

Although we clearly reject the full insurance hypothesis at standard significance levels, it is interesting that household consumption growth is much more respondent to changes in aggregate village consumption than to changes in household income. Our results are sensitive to the functional for specification, so at this stage we are reluctant to place much weight on these estimates.

In order to analyze the effects of the program on preexisting risk-sharing arrangements, our empirical strategy is as follows. Given the experimental nature of the program, we have data on both eligible villages that were included in the program and eligible villages that were randomized out. We can thus split our

sample according to participation into the program, and run the above regression separately for each subsample. If participation in Progresa has displaced preexisting risk-sharing arrangements, then we would observe that $\hat{\beta}_1 < \hat{\beta}_1'$ and $\hat{\beta}_2 > \hat{\beta}_2'$, where the prime denotes the regression coefficients for the subsample of villages that were randomized out of the program.

The results of estimating the same regression separately for each subsample by OLS are as follows:

Table 7: Treatment Group	
Dependent variable: change in log consumption	
Regressor	Coefficient Estimate
$(\ln y_t^i - \ln y_{t-\tau}^i)$	0.498
	(0.007)
$(\ln \bar{c}_t^j - \ln \bar{c}_{t-\tau}^j)$	1.802
	(0.003)
	$R^2 = 0.554$
	$N = 6,935$

Standard errors in parentheses

Table 8: Control Group	
Dependent variable: change in log consumption	
Regressor	Coefficient Estimate
$(\ln y_t^i - \ln y_{t-\tau}^i)$	0.452
	(0.009)
$(\ln \bar{c}_t^j - \ln \bar{c}_{t-\tau}^j)$	1.881
	(0.051)
	$R^2 = 0.598$
	$N = 4,428$

Standard errors in parentheses

From this preliminary regressions, there appears to be no displacement of risk-sharing arrangements once Progresa has been introduced. For the same reasons stated above, we are reluctant at this stage to place much weight on these estimates.

5. Conclusions

To be completed

6. Appendix: A Description of Progresa

The Education, Health, and Nutrition Program, or Progresa for its acronym in Spanish, is the Mexican government's most recent poverty alleviation program. It is a federal income support program started in August 1997 and targeted to rural households living in extreme poverty. Based on its size, it is one of the most ambitious social welfare program ever implemented in Mexico; it currently operates in almost 50,000 rural communities and 2,000 counties distributed across all Mexican states, and benefits approximately 2.3 million households or 10% of the country's total population; its budget in 1999 was about US $800 millions or 0.2% of GDP, approximately the same share as the AFDC in the US. Progresa is interesting from an economic perspective since it explicitly incorporates human capital theory in its design and because it constitutes one of the largest randomized social experiments on which data is available.

6.1. Background

Until recently, social welfare policy in Mexico had been characterized by a series of uncoordinated and unsystematic programs, and the absence of quantitative data needed to perform their econometric evaluation. The first generation of programs, introduced in the late 60's, were characterized by the widespread use of

agricultural price supports and indiscriminate subsidies to certain food items such as tortilla and milk. The systematic collection of household survey data and the availability of the first income and expenditure surveys in the late 70's revealed the inefficiency of these generalized subsidies: since the lowest income deciles accounted for a very small percentage of total expenditure on these commodities, it was mainly middle and upper income households that were benefiting from the subsidies. This fact, along with the fiscal adjustments introduced after the debt crisis of the early 80's, made this type of programs unsustainable. A second generation of programs began in 1988 with the introduction of the National Solidarity Program, or Pronasol for its acronym in Spanish. Pronasol replaced the indiscriminate subsidy schemes with community-based, targeted programs. The most innovative feature of these programs was that they were usually focalized and often required participation from the communities. Unfortunately, the targeting mechanisms were never clear, and no systematic data were collected to evaluate the various programs. Pronasol eventually fell into discredit since there was widespread perception that the government had used it to gain political support (cf. Dresser (1997)). A third generation of programs began in 1997 with the introduction of Progresa. The idea of a highly focalized, comprehensive poverty alleviation program was originally proposed in Levy (1991). A program closely

resembling Progresa under the name of Pilot Program of Nutrition, Food, and Health (PNAS) was introduced in 1991 in the states of Estado de Mexico, Nuevo Leon, San Luis Potosi, and Tamaulipas (cf. Alagon, *et al.* (1997)).

Although more modest in its scope and size, the Bolsa-escola program in Brazil is the closest precedent to Progresa in terms of its design. In January 1995 the governments of Campinas, in the state of Sao Paolo, and Brasilia, in the Federal District, introduced Bolsa-escola, an educational program intended to reduce poverty and increase schooling attendance and enrollment among children of low income families. The two programs share some unique features: (i) both are targeted to low income families and are highly focalized (eligibility into the programs is means-tested); (ii) both programs condition the delivery of monetary grants to eligible families on regular schooling attendance by children[4]; and (iii) the female head of the household is the recipient of the grant.

There are also important differences between the two programs: (i) Progresa is a federal program covering over 2 million families in all Mexican states, while Bolsa-escola is a state program limited to certain municipalities and covered about 22,000 families in 1998; (i) Progresa is a integral poverty alleviation program which

[4]In the case of Progresa, children have to attend to at least 85% of the classes, while in the case of Bolsa-escola, children have to attend to at least 90% of the classes.

includes education, health and nutrition components, whereas Bolsa-escola is limited to educational grants; (ii) in order to reflect the higher opportunity cost of elder children, the amount of the educational grants in Progresa increase as the children progress through the school system; (iii) in order to reverse the gender gap in educational attainment, the amount of the educational grants in Progresa is higher for girls than for boys at the high-school level; (iv) the educational grants in Progresa are proportional to the number of children enrolled (up to a monthly maximum of US $80 per family), whereas in Bolsa-escola the educational grants is a fixed amount per family; (v) Progresa is specifically targeted to rural households, whereas Bolsa-escola beneficiaries live in rural as well as in urban areas; (vi) while the evaluation of the program has been an integral part of the design of Progresa, no comparable data exist for evaluating the Bolsa-escola program; (vi) Bolsa-escola includes a savings component where an amount is deposited on an individual family account which can only be withdrawn upon the successful completion of certain number of years of schooling.

Conditional income support programs similar to Progresa and Bolsa-escola are currently being considered or implemented in other Latin American countries, including Argentina, Ecuador, Honduras, and Nicaragua.

6.2. Characteristics of the Program

Progresa is an income support program targeted towards households living in extreme poverty. The selection of eligible households is a based on a three-stage targeting process. First, a geographical selection is made of highly marginalized regions. For this purpose an "index of marginalization" was constructed using information from the 1990 Census (Censo General de Poblacion y Vivienda 1990). The variables used to construct this index were literacy of individuals 15 years or older, dwellings without water, dwellings without electricity, dwellings without drainage, dwellings with mud floor, average number of occupants per room, and the population working in the primary sector. Second, a selection of beneficiary household was made from each of the communities selected in the first stage. For this purpose a comprehensive measure of income was constructed using information on household characteristics from census data collected specifically for this purpose. The variables included in the measure of "permanent" income included size and family composition, number of income earners, economic activities and incomes of all family members, education levels of each family member, presence of disabled individuals, household dwelling characteristics, availability of basic services, ownership of durable goods, and ownership of land and animals. Third, a community assembly with local authorities and eligible families took place where

an agreement was reached on the list of eligible families.

Progresa has three components, namely education, health, and nutrition. In education, grants are provided for each child under 18 years of age enrolled in school between the third grade of elementary and the last grade of high school. The amount of the grant increases as children are promoted through the school system, and at the high school level the amount of the grants is slightly higher for girls than for boys. In addition, an annual monetary grant is provided to each child for school supplies. The average annual amount per family of the education component is US $175. In health, a basic health package is provided free of charge to all family members. Preventive health is emphasized through education and training in health, nutrition, and hygiene. In nutrition, dietary supplements are given to all children less than two years of age and to all pregnant or lactating women. In addition, a fixed monetary benefit is given to all households to complement their income and promote better family nutrition. The average annual amount per family of the nutrition component is US $180. All benefits are delivered in cash to the female head of the household every two months. Parents are free to use benefits as they see fit, although they are encouraged to spend benefits on improved food consumption and education. The benefits of the program constitute approximately 25% of household average income.

Progresa conditions the delivery of monetary grants on certain actions that must be taken by the household. In particular, the educational grants are linked to regular school attendance of children, so that they must attend at least 85% of days in a month for the family to receive the benefits. Similarly, families must complete a schedule of visits to the health care clinic to receive the fixed monetary support.

Both the operation and the effects of the program are evaluated periodically through the collection and analysis of comprehensive household surveys. The official evaluation of the program is performed both by Progresa's own staff as well as by an independent group of consultants from the International Food Policy Research Institute (IFPRI). Thus far, the official evaluation of the effects of Progresa has centered around its impact on four main areas, namely health, educational, consumption, and labor supply. With regards to consumption, the evaluation has focused on the effect of the program on increasing consumption levels and reducing inequality in consumption (cf. Hoddinot and Skoufias (2000), Straffon and Handa (1999), and Teruel and Davis (1999)). As with the evaluation of the other components of the program, the empirical strategy has been exploiting the experimental nature of the program and using the differences-in-differences estimator to estimate the mean impact of the program.

7. References

Alagon, Javier, Enrique de Alba, and Antonio Villa (1997), "Evaluacion del proyecto piloto de nutricion, salud y alimentacion," in *Pobreza y politica social en Mexico,* Gabriel Martinez, ed., ITAM, FCE, Mexico, 1997.

Attanasio, Orazio, and Jose Victor Rios-Rull (1999), "Consumption Smoothing in Island Economies: Can Public Insurance Reduce Welfare?" mimeo, University of Pennsylvania.

Behrman, Jere R., and Petra E. Todd (1999), "Randomness in the Experimental Samples of Progresa (Education, Health, and Nutrition Program)," mimeo, International Food Policy Research Institute (IFPRI), Washington, D.C., March 1999.

Cochrane, John H. (1991), "A Simple Test of Consumption Insurance," *Journal of Political Economy,* Vol. 99, 5, pp. 957-976.

Deaton, Angus (1997) *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy.* Published for the World Bank by The John Hopkins University Press, Baltimore, Maryland.

Dresser, Denise (1997), "En busqueda de la legitimidad perdida. Pronasol, pobreza y politica en el gobierno de Salinas" in *Pobreza y politica social en Mexico,*

Gabriel Martinez, ed., ITAM, FCE, Mexico, 1997.

Encuesta de Evaluacion de los Hogares, Marzo 1998 (ENCELM 98),Cuestionario de Localidad, Secretaria de Desarollo Social, Mexico, 1999.

Encuesta de Evaluacion de los Hogares, Octubre 1998 (ENCELO 98), Cuestionario de Localidad, Secretaria de Desarollo Social, Mexico, 1999.

Hoddinot, John, and Emmanuel Skoufias (2000), "Preliminary Evidence on the Impact of Progresa on Consumption," mimeo, International Food Policy Research Institute (IFPRI), Washington, D.C., January 2000.

Kreps, David M. (1990), *A Course in Microeconomic Theory,* Princeton N.J.: Princeton University Press.

Levy, Santiago (1991), "Poverty Alleviation in Mexico," *PRE Working Papers,* Washington D.C.: The World Bank.

Mace, Barbara J. (1991), "Full Insurance in the Presence of Aggregate Uncertainty," *Journal of Political Economy,* Vol. 99, 5, pp. 928-956.

Straffon, Beatriz, and Sudhanshu Handa (1999), "El impacto de Progresa en el consumo de las familias beneficiarias" in *Mas oportunidades para las familias pobres. Evaluacion de Resultados del Programa de Educacion, Salud y Alimentacion. Primeros Avances, 1999.* Secretaria de Desarollo Social, Mexico, 1999.

Teruel, Graciela, and Benjamin Davis (1999), "A Preliminary Evaluation of

the Impact of Progresa. Cash Transfers on Private Inter-Household Transfers," mimeo, International Food Policy Research Institute (IFPRI), Washington, D.C., April 1999.

Townsend, Robert M. (1993), *The Medieval Village Economy: A Study of the Pareto Mapping in General Equilibrium Models,* Princeton N.J.: Princeton University Press.

Townsend, Robert M. (1994), "Risk and Insurance in Village India," *Econometrica,* Vol. 62, No. 3, pp. 539-591.

Townsend, Robert M. (1995), "Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low-Income Economies," *Journal of Economic Perspectives,* Vol. 9, Num. 3, pp. 83-102.

Wilson, Robert (1968), "The Theory of Syndicates," *Econometrica,* Vol. 36, No. 1, pp. 119-132.