Managing Economic Insecurity in Rural El Salvador: The role of asset ownership and labor market adjustments[#]

Jonathan Conning[*]
Pedro Olinto[**]
Alvaro Trigueros[***]

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Abstract

Rural households often rely heavily on short-term readjustments in labor supply between wage and self-employment in farm and non-farm activities as an essential strategy to protect consumption and the value of productive investments against unexpected shocks and to take advantage of changing economic opportunities. The efficacy of such coping strategies, and hence a household's vulnerability to shocks, may in turn be affected by that household's ownership of land or other assets. This paper employs a two-round panel survey of 494 rural households in El Salvador to study the impact of a 1997 weather-related downturn in economic activity and agricultural labor demand on household incomes and welfare. Examining the changing pattern of household labor supply and poverty, reveals that the loss of wage labor hours was a primary determinant of the rise in poverty in this period, and that landless agricultural laborers were particularly vulnerable. Panel regression analyses suggest that households that owned even small amounts of land or other productive assets were better able to protect the marginal return to household labor in the downturn year. The results lend support to the view that in response to shocks, households fall back on farm and non-farm self-employment activities were productivity was determined by their ability to intensify the use of land and other owned assets. Controlling for other factors, ownership of land and other assets also helped households to maintain children's school enrolments.

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[*] Department of Economics, Williams College, Williamstown, MA, USA.
[**] International Food Policy Research Institute, Washington, DC, USA
[***] Departamento de Economía, Universidad Centroamericana (UCA), San Salvador, El Salvador.

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Introduction

> *A small peasant and a landless labourer may both be poor,*
> *but their fortunes are not tied together.*
> Amartya Sen, Poverty and Famines (1982, p. 156).

In addition to the usual uncertainties associated with natural elements and the seasons, rural households in El Salvador over the past few decades have had to adapt to the disruptions and changing opportunities caused by violent political conflict, the large-scale displacement of populations, property rights reforms[1] and, since the early 1990s, by the far-reaching liberalization of markets. More recently rural households' income generating and risk-coping strategies have been again tested and strained by a string of natural disasters including Hurricane Mitch, and the disruptions of El Niño and two large earthquakes.

Until recently, the absence of good household survey data has made it difficult to study the income generating and risk coping strategies that rural households in El Salvador have deployed in this context. This paper takes advantage of a unique new panel dataset of 494 rural households in El Salvador in the 1995-1998 period to shed some light on this matter. We study the correlates of poverty and vulnerability, focusing in particular on the differentiated pattern of adjustment responses to a 1997 weather-related downturn in rural economic activity.

In recent years economists have paid increasing attention to the myriad of supposed ways in which households smooth consumption in the risky and uncertain economic environments in which they live (Townsend 1994; Morduch 1995; Udry 1995). Most attention by far has focused on how informal financial markets and safety nets, and the management of assets such as livestock or other types of saving might help to smooth consumption in the face of idiosyncratic income shocks.

[1] These include agrarian reform measures in the eighties and land transfers to ex-combatants following the 1992 peace accords. Both reforms implied a redistribution of approximately 30 percent of agricultural land. For an account of these events see McReynolds et al. (1989), Seligson et al. (1993), Foley, et. al. (1997), and Wood (2000).

While these mechanisms are indeed important, mounting empirical evidence suggests that such financial strategies are typically weak or insufficient, and often represent only one element of households' actual response. A possibly more important strategy in many instances are households' efforts to diversify income-generating sources before shocks occur, or to re-adjust labor supply decisions after a shock has occurred. While the use of such costly strategies can be interpreted as direct evidence that less costly credit and insurance solutions are failing, the importance of such labor market mechanisms should not be that surprising given how labor is the principal asset owned by the poor.

Kochar (1999) provides compelling evidence of the centrality of labor supply readjustments in households' coping strategies in her recent re-examination of Townsend's (1994) classic study of consumption smoothing in Indian ICRISAT villages. Many economists have interpreted Townsend's finding of substantial correlation in consumption across households in these villages as evidence of extensive informal risk sharing arrangements and asset transactions. What Kochar demonstrates however is that over three-quarter's of this correlation can be accounted for by households' increased labor supply to the agricultural wage market following a shock to their farm production. In other words, when hit by an idiosyncratic production shock, households appear to have smoothed consumption by smoothing income rather than via financial transactions.

This paper documents the diversity of ways in which rural households in El Salvador deploy their labor between farm and non-farm self-employment and wage employment activities, how these different labor insertion strategies have been correlated with poverty, and the determinants of households' differential ability to smooth income in response to shocks and changing circumstances via their efforts to reshuffle labor across activities. We focus in particular on the impacts of a sharp and largely unexpected downturn in agricultural and non-agricultural wage labor demand in 1997-98, largely due to the uneven and largely unpredicted consequences of the El Niño weather phenomenon on the rural economy. The disruption to wage employment opportunities is evident in our sample, as average agricultural wage labor hours fell a dramatic 25 percent compared to the earlier 1995-1996 survey. Faced by the sudden loss of wage labor opportunities,

and with little access to formal credit or savings and little in the way of public safety nets, many households responded primarily by redeploying labor toward new or existing income generating activities in farm and non-farm self employment activities.

Using dynamic poverty decomposition analyses we show that a large fraction of the substantial measured increase in poverty that took place between 1995 and 1997, as captured by three alternative poverty measures, can be attributed to a dramatic loss of agricultural and non-agricultural wage employment -- the aggregate number of hours worked in wage employment fell by over 20 percent. Finding themselves unable to sell as many hours on the agricultural wage market in 1997 as in 1995, households appear to have substituted labor into farm and non-farm self-employment strategies, where productivity is often low.

Our panel regressions explore the role that households' initial ownership of physical and human capital assets played in shaping vulnerability to welfare losses. In a world of complete and competitive markets, a household's marginal product of labor in self-employment activities ought to equal the opportunity cost of labor time as measured by the market wage. This marginal product of labor furthermore ought to be independent of the household's ownership of tradable factors such as land. But if households are unexpectedly unable to sell as much of their services to the wage labor market as they would like, then their households' ownership of productive assets may affect the marginal product of labor, because some households can respond to the loss of wage hours by intensifying the use of a productive asset. Households without access to such assets do not have the same fallback options, and therefore are more vulnerable to disruptions in the labor market.

The panel regression results provide support for the hypothesis that the marginal product of household labor is affected by households' ownership of assets during a downturn year but not in a normal year when labor markets are tight. Controlling for other factors, ownership of land and other assets also increased the probability of a household keeping their children enrolled in school. Other assets such as household

ownership of a sewing machine had similar effects. Households with better-educated heads were also better able to preserve the earning power of labor in a bad year.

By identifying the correlates of poverty and vulnerability in rural El Salvador, this study may contribute to the identification of simple targeting criteria for the design of poverty alleviation policies and safety nets. Landless agricultural wage laborers were found to be particularly vulnerable to suffering sharp income losses, and the most likely to have responded to an income shock by removing children from school. While we concur with the earlier cross-sectional studies of the rural sector in El Salvador[2] that a large part of the rural poor are smallholding farming households, and that small holdings of land do not appear to do much to raise households out of poverty, our finding that even small land ownership protects the marginal product of labor and school enrollments during downturns supports economic and anthropological interpretations that have claimed that land ownership often plays an essential role in family risk coping strategies. The findings also provide evidence to document and clarify the important role of farm and non-farm self-employment in rural incomes and as a fall-back safety option in hard times, and in increasingly liberalized economic environments (de Ferranti, Perry et al. 2000; Reardon, Berdegue et al. 2001).

The rest of the paper is organized as follows. The next two sections provide background on the rural economy of El Salvador and describe the dataset. A preliminary tabular examination of the data and a dynamic poverty decomposition analysis that is then presented as a first step for identifying which groups of households were most poor and vulnerable to the economic downturn in 1997. Next we employ panel regression analysis to investigate the correlates of poverty and vulnerability and to identify whether and how household asset position affected the adjustment. A later section examines the differential impact of the downturn on school enrollments, again focusing on the role that land and initial education might play in affecting these outcomes. A final section concludes.

[2] Studies that used the first cross-section of the dataset include Lopez (1998) Lanjouw (2001), Larde and Arguello (1999) and Briones and Andrade-Eekhoff (2000). Beneke de Sanfeliu (2000) employs the panel.

Economic Background

Events during the two-year 1995-97 period covered by our dataset provide the stage for an experiment of sorts.[3] The 1995-96 season was comparatively good for El Salvador's agriculture, with output growth of 4.5 percent, well above the decadal average of 1.9 percent. By comparison, the year 1997 was a bad year, with a sector growth rate of barely 0.4 percent disguising substantial disruption to agricultural production and employment in several regions and crops due to the El Niño weather phenomenon. Harvest wage labor demand in crops such as coffee and sugarcane was sharply down. These effects appear to have been largely unexpected. For example, the Ministry of Agriculture revised its forecast of the coffee harvest downward by 17 per cent relative to its prior official predictions well into the harvest season in early 1998 (Financial Times, 1998).

In the sections that follow we study household level adjustment in labor supply, incomes and welfare amongst the panel households in response to the downturn in economic activity in 1997. We first turn briefly to the task of situating these events in the historical context of an economy subject to deep long-term structural changes and movements in relative prices.

At 292 inhabitants per square kilometer in 1998, El Salvador is one of the most densely populated countries. Past neglect of investment in education and health, particularly in rural areas, has led the country to one of the lowest human development indexes (HDI) in Latin America (UNDP, 1999). During the 1979-1992 period El Salvador was convulsed by a violent civil war, at a cost of over seventy thousand lives, the displacement of a million and a half people, and several billion dollars of lost production and infrastructure. The war came to a formal end with the 1992 Peace accords. [4]

[3] These panel survey years correspond to income earned during the 1995-96 and 1997-98 agricultural seasons.

[4] One consequence of the war was a redistribution of approximately 30 percent of agricultural land, achieved both through agrarian reforms in the eighties, and land transfers to ex-combatants as part of the

Rebounding from war's end, the economy experienced a brief period of rapid growth, averaging 6.8 percent from 1992 to 1995.[5] Growth since then has slowed, however, to a less impressive 3 percent. Important sectoral adjustments have taken place. Between 1991 and 1999 the share of agriculture in total GDP fell from 16.5 percent to 12.9 percent, continuing a trend established before the war. This sectoral decline is attributable to many factors, including: i) years of disinvestments during the war and relative policy neglect after the war; ii) the continued real appreciation of the currency due to the rise of family remittances from abroad and the country's macroeconomic policy stance and trade liberalization; iii) tight monetary policies and financial liberalization that led to a decline in agriculture's share in total credit and an increase in the cost of financing; and iv) a series of natural disaster shocks, including most recently a drought caused by El Niño in 1998, the destruction of hurricane Mitch in 1999, and (since then) two major earthquakes in 2001.

A large fraction of the population and workforce still lives and labors in the countryside, even as out-migration has been steady. In 1999, 41.9 percent of the population lived in rural areas, 37.3 percent of the economically active population (EAP) was rural, and 53.4 percent of the rural EAP worked in agriculture. While the urban poverty rate has fallen over the last decade, and social indicators have in general improved, rural poverty has remained stubbornly high (1999). For example, while the official urban poverty headcount rate fell from 52.9 percent in 1992 to 36.0 percent in 1998, rural poverty only declined from 65.0 percent of households to 58.6 percent, and improvement has not been steady. The real minimum wage for harvesting coffee and sugarcane fell 12.1 and 11.0 percent between 1993 and 1998, even as national GNP grew. Over the 1995 to 1997 period considered in analysis below, the real minimum agricultural wage fell by 8.6 percent

Access to credit in rural areas is limited. Given the unfavorable macroeconomic environment for agriculture, the share of total credit to the agricultural sector from

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end of war settlement. For an account of these events see McReynolds et al. (1989), Seligson (1993), Foley, et. al. (1997), and Wood (1995).

commercial banks and *financieras* dropped sharply, from 21.0 percent of the national total in 1992 to only 8.2 percent in 1999. Scarcely 20 percent of rural households in 1996 had outstanding debt balances from formal or informal sources (World Bank 1998), and less than 14 percent of the panel households reported having a savings account in 1998. With little access to formal credit and savings markets and little evidence of extensive informal finance networks, rural households have had to find other ways to anticipate and cope with shocks. These include the accumulation and de-accumulation of productive assets, changing patterns of labor markets participation and land use, and migration and remittances.

The Panel Dataset

The data set we employ is a two-year panel of 494 rural households first interviewed in 1996 and again in 1998.[6] The first round of household surveys was conducted by the Fundacion Salvadoreña para el Desarollo Economico y Social (FUSADES) in collaboration with the World Bank, and the 1998 survey by FUSADES and The Ohio State University with funding from USAID's BASIS (Broadening Access and Strengthening Input Systems) research program.

The 1995-96 agricultural year cross-section served as a principal input into the World Bank's (1998) El Salvador Rural Development Study. Beneke de Sanfeliu (2000) and Lopez (1998), offer detailed descriptions of the survey's design and its comparability to other datasets. The survey was designed as a stratified random sample aimed to be representative of the rural population at a 10 percent significance level.[7] A total of 738 rural households were interviewed in 1996. Of these, 628 form part of a nationally representative 'primary sample,' subdivided into 192 'land using' farm households employing 0.5 or more *manzanas* of land, and 428 'rural worker' households using less

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[5] For a general overview of the Salvadoran economy in the nineteen nineties see Boyce (1996), Melhado (1997), and Rivera Campos (1999,2000).

[6] A third round of interviews was conducted in 2000, but the dataset was not yet processed for analysis at the time of writing this paper.

[7] The initial stratification was based on findings from the 1992 labor force census. The stratification method called for only 192 'land using' households to be nationally representative, but an additional 110 households were added to permit agricultural production analysis (FUSADES and World Bank. 1998).

than this amount of land.[8] A supplemental sample of 110 land using households was added in order to have enough observations to carry out meaningful statistical analysis of farm production activities.

The survey instrument was modeled on the World Bank's Living Standards Measurement Survey (LSMS). The dataset is the most comprehensive available for El Salvador.[9] Its principal limitation is that it does not record household consumption expenditures. It is a widely held view that consumption expenditures are often measured with more accuracy and provide a better indicator of household welfare than income (Ravallion 1994). However, the survey is very detailed in recording the many sources of household income, including income from self-employment activities as well as household asset position and credit transactions. Based on rough calculations from national level figures of agricultural GDP, Lopez (1998) estimates that income underreporting in the sample could be as high as 20 percent, and suggests adjusting all household incomes upward accordingly.[10] This issue is discussed in further detail in the section on poverty decompositions below.

In 1998 a total of 494 households from the original primary sample of 628 were re-interviewed in order to create a matched panel. The attrition rate was 24 percent.[11] As attrition bias is a possible concern, we tested for equality in the 1996 means of variables of attritor and non-attritor households under the assumption that sample variances are unknown and different (Fitzgerald, Gottschalk et al. 1998; Alderman, Behrman et al. 2000) As might perhaps have been expected, households that left the sample were more likely to be headed by somewhat younger and better educated individuals, and to have fewer children. However, we found no significant difference in means between attritor

[8] One *manzana* of land represents approximately 0.714 hectares or 1.77 acres of land.
[9] The Salvadoran National Directorate of Studies and the Census (DIGESTYC 1999) collects the Multipurpose Household Survey (MPHS) using a shorter nationally representative household survey administered to roughly 20,000 households annually. Although this survey is designed as a rotating panel, DIGESTYC has not yet made the data available in panel form. See Lanjouw (2001) for an analysis of the cross-sections.
[10] As coffee plantations account for a large fraction of agricultural GDP and yet there are no coffee plantation owners in the sample, this figure may overestimate the degree of underreporting.

and non-attritor households for the main variables of interest such as income per capita, non-land assets owned, or household labor hours worked in different activities. This gives us fair confidence that attrition bias is not an important concern in the analysis below.

Which groups are most poor and vulnerable?

Income per capita by quintiles

Panel data allow us to follow changes in income and welfare for particular population subgroups in ways that successive cross-section snapshots cannot. Table 1 classifies the 494 panel households into per-capita income quintiles. Given the high variability of incomes, using actual income per capita to classify households by quintile may present a misleading impression of income growth because a household's' classification would be correlated with the income shocks it has received in a base year. For example, a household that received a big negative income shock in 1996 might be classified as poor in that year and subsequently appear to experience rapid growth as its income reverted to its permanent level in 1998. To avoid this type of problem we classified households into quintiles using *predicted* income per capita (not including remittances) from a proxy means regression.[12] By construction, predicted income should be uncorrelated to household-specific income shocks.

The table draws attention to the highly differentiated income growth experiences of households in the sample and to the role of household size. The lower half of the table reports that in real terms average total household income fell by a relatively moderate 0.2 percent between 1995 and 1997. However, this sample average masks that the fall in income within the poorest two quintiles was far more pronounced. The lowest quintile of households lost over a third of their 1995 income, while the top two quintiles were able to

[11] In 1998 the survey team set out to re-interview all 628 households in the 1997 primary sample (as described in the text above) and was able to re-interview 469 of these. The panel was then augmented to 494 households by re-interviewing 25 additional households from the supplemental sample.

[12] We regressed income per capita (excluding remittances) on a collection of variables, their squares, and interactions. The variables included number of adults and dependents, male and female education levels, age of household head, and assets owned including land, real estate, livestock and machinery. The

take advantage of the changing opportunities in the Salvadoran economy to raise their income by 6.5 percent. Because incomes fell more sharply in poorer households where household sizes tend to be larger, income per capita fell by 5 percent. Average household size in the lowest quintile was 6.9 individuals, approximately 45 percent larger than households in the highest quintile, which had 4.7.[13]

Remittances

Table 3 underlines the important role of remittances in this economy. Although in 1998 remittances represent only 7.9 percent of average per-capita household income for the entire sample (up from 6.3 percent in 1996), they account for over one-third of income in the approximately one-fifth of households that received these transfers in 1998. In the lowest quintile remittances accounted for one half of income for receiving households. One must caution, however, that this last effect is largely a consequence of the way that quintile classifications were constructed using predicted income *not including* remittances. When a household member migrates to find work, household income excluding remittances of those left behind falls and the household is more likely to be classified as poor. When remittances are then counted, they appear as an important component of total household income.

Did remittance income help mute the decline in household income between 1995 and 1997? Income per capita would have fallen 7.4 percent instead of 5.1 percent had we excluded remittances from income. In the lowest quintile group, remittances cushioned the fall in incomes between 1995 and 1997 from what would have been a 43 percent decline to a 32 percent decline. But the information in the tables does not allow us to disentangle fully whether remittances increased in response to negative income shocks, or whether the rising importance of remittances reflects the substitution of income sources that occurs as family members sent out new migrants.

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regression explained approximately 32 percent of the variance in income per capita. We then classified households into quintiles using average predicted per capita income over the two years.

[13] In 1995 average household size for quintiles 1 through 5 were, respectively, 6.9, 6.4, 6.2, 5.8, and 4.7 individuals. Household size grew from 1995 to 1997 by –1.8, 0.2, 7.1, 4.0, and 0.2 percent respectively and overall population growth was 2 percent. The relative decline in the size of the two smallest quintiles may reflect migration.

To disentangle issues further, we turn to a more disaggregated study of the differentiated impact of income changes as measured by poverty decompositions and regression analysis, and the pattern of household adjustments on the labor market and with respect to investments in education.

Labor Supply and its Reallocation

Table 3 describes the diversity of income generating activities both within and across rural households and the significant adjustments in labor allocations over the two-year period. The table distinguishes between agricultural and non-agricultural self-employment and wage labor employment categories. Agricultural self-employment activities include working on farm or garden-plot production or tending animals for self-consumption or the market, including any time spent selling those products. Non-farm self-employment activities include hours worked in craft production, manufactures, repairs or other production or service activities such as running a store. None of these categories includes activities such as collecting wood or water, or domestic chores such as food preparation or childcare.

Agricultural self-employment activities are the leading outlet for household labor (partly reflecting the large number of farm households in the sample), but non-agricultural and agricultural wage labor employment is also important. Households in the sample worked more hours in non-agricultural occupations than in agricultural wage labor, although the distribution between these categories varied greatly across income quintiles. Lower quintile households were much less likely to have non-agricultural wage employment.

A dramatic reallocation of labor hours occurs over the short span of just two years. Whereas in 1995 wage labor hours represented 60 percent of household labor supply compared to 40 percent to self-employment activities, by 1997 this allocation is almost entirely reversed. This represents a nearly 20 percent drop in total wage labor hours, and a 24 percent fall in agricultural wage labor hours. The fall affected both agricultural and non-agricultural categories, but 58 percent of the drop can be attributed to a decline in agricultural labor hours. As the table indicates, the fall is due both to a fall in the net

number of participating households and to a fall in the number of hours sold per participating household.

Households can be seen to substitute for wage hours lost by increasing labor hours dedicated to agricultural and non-agricultural self-employment activities. Overall household labor supply actually increases six percent, or about 4 hours per week per household. Almost 20 percent more households were engaged in self-employment activities in 1997 compared to 1995, and the number of households in some form of non-agricultural self-employment activity more than doubled. Over half the increase in self-employment hours is in agricultural self-employment activities, but non-agricultural self-employment grows more quickly from a lower base (by 148 percent).

A reallocation of labor supply from (tradable) agricultural to (non-tradable) non-agricultural employment is consistent with the continued real appreciation of the currency. Nonetheless, the abruptness of the fall in incomes for so many households and the known fall in labor demand associated with the disruptions to coffee and sugar and other crops suggest that much can be attributed to labor demand shocks.

A Dynamic Poverty Decomposition

There are many ways to define household welfare or socioeconomic status. A poverty index is a simple income-based aggregative measure that can capture both the level and distribution of welfare across households and individuals at a given moment in time. A very simple definition of vulnerability is to examine variability in household's poverty status over time. This section first decomposes three commonly used measures of poverty according to households' labor market insertion status in each of the two survey years, and then, in order to try to better understand which groups were most vulnerable in practice, we decomposes the *changes* in measured poverty between the two survey dates into changes in poverty within sub-groups and population shift effects due to the movement of households from one subgroup to another.

We employ the widely used FGT-class of poverty measures due to Foster-Greer-Thorbecke (1984). If the population in a given period is ordered according to income per

capita y_i and z is the poverty line or level of income below which a household is classified as poor, then the FGT(α) class of poverty measures is defined as:

$$P(\alpha) = \frac{1}{N}\sum_{j=1}^{q}\left(\frac{z - y_i}{z}\right)^{\alpha}$$

Where q is the number of households below the poverty line z, N is the population size, and α is a parameter. When α = 0 we obtain the simple *headcount ratio* $P(0) = q/N$, and N is the total number of households. When α = 1 we obtain the *mean proportionate poverty gap* $P(1) = \sum_{j=1}^{q}((z - y_i)/z)/N$, which is a better measure of the *depth* of poverty. Here $(z - y_i)$ is the poverty gap or income shortfall from the poverty line for household i, and $(z - y_i)/z$ is the proportionate poverty gap, or the poverty gap measured as a fraction of the poverty line z. When α = 2 we have *mean proportionate squared poverty gap* $P(2) = \sum_{j=1}^{q}((z - y_i)/z)^2/N$ which gives a measure of the *severity* of poverty by giving weight to households in proportion to the square of their distance below the poverty line. Non-poor households are given zero weight in all three measures.

An advantage of the FGT poverty measures is that they are additively decomposable. If we partition the N households in the sample into m different population subgroups of sizes N_j, where $j = 1...m$, then aggregate poverty measure $P(\alpha)$ can be expressed as a weighted average of the population subgroup poverty measures P_j, by the formula $P(\alpha) = \sum_{j=1}^{m} n_j \cdot P_j(\alpha)$, where $n_j = N_j/N$ are subgroup's j's population share.

El Salvador's General Directorate of Studies and the Census (DIGESTYC 1999) sets a rural poverty line at twice the indigence level, calculated as the cost of purchasing a basket of goods that will deliver a minimum recommended caloric intake . In 1995 and 1997 these official poverty lines were set at 4284 and 4348 colones per capita respectively, both measured in colones of 1997 (approximately US$ 489 and $496). Applying these figures to its multipurpose household survey, DIGESTYC calculated a

rural poverty headcount ratio of 58.2 percent in 1995 and 61.6 percent in 1997.[14] Applying *their method* and poverty line to our panel leads to poverty headcount estimates of 67 percent and 71 percent respectively. These numbers suggests that the average household selected into the panel was poorer, and/or that income under-reporting is larger, than in DIGESTYC's larger sample.[15] As a conservative palliative to possible under-reporting, in the analysis that follows we have set poverty lines twenty percent below DIGESTYC's (at 3427 and 3478 colones respectively), and we count individuals living in poverty, not households. This leads us to poverty headcount ratio estimates for 1995 and 1997 of 63.8 and 68.8.

Since for the purposes of this paper we care less about accurately measuring the absolute level of poverty than about comparisons across subgroups and changes over time, debates over the exact poverty line should not distract us unduly. Poverty comparisons can, however, be sensitive to the choice of poverty line and measurement error. Figure 1 demonstrates, however, that the 1997 cumulative distribution of real income per capita lies everywhere above the 1995 distribution, at least up to per-capita incomes of about 5000 colones. This first order dominance condition means that by any of our measures poverty would be found to be higher in 1997 compared to 1995 for any poverty line below 5000 colones, a figure well above the range we need consider (Ravallion 1994).

[14] However, we believe their method under-represents poverty as it counts households rather than individuals living in poverty by assuming a uniform household size for the rural sector in each period. This introduces bias because, as pointed out in footnote 13, households in lower income quintiles are almost fifty percent larger than those in the top quintile, and had much higher dependency ratios. Taking household size into account brings our estimated headcount for the panel households to 73.4 and 74.7 percent for 1995 and 1997 respectively.

[15] As previously discussed, Lopez (1998) estimates that income underreporting in the FUSADES dataset could be as much as twenty percent.

Figure 1: Cumulative distribution of real income per capita

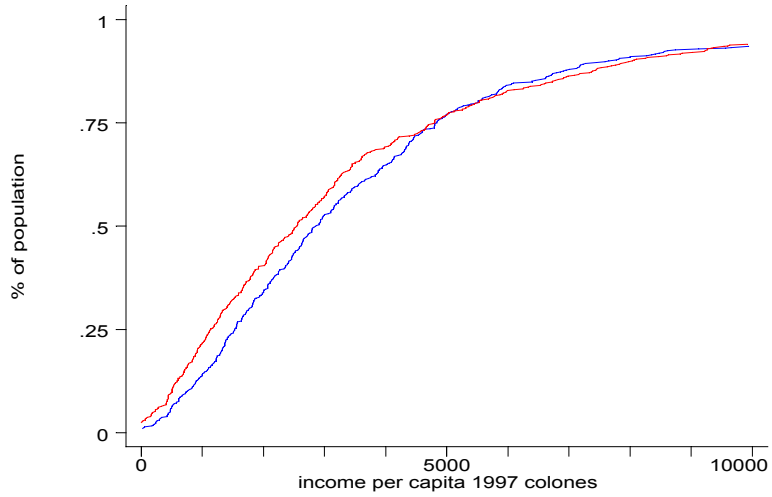

Table 4 presents poverty decompositions by occupational categories within each year and between the two time periods. In each period households were classified into one of nine household labor market insertion sub-categories, depending on whether a household member earned income from each of these three income sources: agricultural wage labor, non-agricultural wage labor and self-employment. The self-employment category includes both farm and non-farm self-employment income. Nine households that did not earn from any of these sources were excluded, leaving a panel of 485 households. The columns indicated by n_{ti} indicate population shares in these categories for each year, and P_{ti} indicates the value of each respective poverty measure within a subgroup. The 'share' column $(n_{ti}P_{ti})/P_t$ indicates the share of the aggregate poverty measure in year t that is accounted for by population subcategory i.

Table 4 shows that the poverty headcount was highest in both years amongst households entirely dependent on a $_{1997}$ ıral wage employment, but the depth and severity measures are actually worse for households that depend on self-employment alone. This suggests the diversity of situations found within the self-employed category. Households with access to non-agricultural wage employment were the least likely to be poor. There were significant changes in households' occupational classification from one year to the other, as indicated by the changing population shares n_{it} and by the transition matrix in Table 5. The largest population shift is into the self-employment-only category,

where the population share jumps from about 15 percent in 1995 to 22 percent by 1997. By definition, the net increase in this category is due to households having lost or abandoned agricultural or non-agricultural wage employment.

The right hand panel of Table 4 decomposes the increase in each of the three poverty measures as follows:

$$P_{97} - P_{95} = \sum_i (P_{i97} - P_{i95}) n_{i95} \quad \text{(intra-sectoral effects)}$$
$$+ \sum_i (n_{i97} - n_{i95}) P_{i95} \quad \text{(population shift effects)}$$
$$+ \sum_i (P_{i97} - P_{i95})(n_{i97} - n_{i95}) \quad \text{(interaction effects)}$$

The overall *increase* in poverty (P_{97} - P_{95}) is decomposed into *intra-sectoral effects* (how much changes in poverty within each sector or category would have contributed to the increase had the 1995 population shares remained unchanged), *population shift effects* (how much poverty would have increased due to the observed increases or decreases in population shares had poverty within each group remained at the 1995 levels), and *interaction effects* that take into account correlations between population movements and poverty (interaction effects contribute toward an increase in poverty if households are shifting into sectors were poverty is higher). The table shows contributions as percentages of the overall increase of each poverty measure. A positive number means the effect increased poverty, a negative number suggests it lessened poverty.

By far the largest contributor to increases in poverty as captured by any of the three poverty measures is the self-employed only category, and in particular, the increase of households in the category. The next largest contribution is from the increase of poverty amongst households that participate in both agricultural wage employment and self-employment. That the category of households that only have agricultural wage employment contributes to a decrease in overall poverty is almost entirely due to the sizable 'exit' of households from a category where poverty was high to start. As Table 5 indicates, however, most of these households moved into pure self-employment (001) or started up new self-employment activities to supplement agricultural wage employment (101), the two categories where poverty indices rose the most in 1997. These facts are

consistent with the hypothesis that many households had to 'fall back' onto self-employment activities in response to the loss of wage employment. Although some households are finding new wage jobs and hence being lifted further out of poverty, the overall effect is a clear net loss of wage hours.[16]

These decompositions tell us which broad household groups were observed to be most poor or vulnerable, but they say relatively little about other correlates or underlying causes of these conditions. To investigate these matters, we turn to regression analysis that relates households' earnings to household characteristics and initial asset position.

Panel Regression Analysis

Conceptual Framework

When a household can supply as much labor as its members want at the prevailing market wage, the shadow price of labor on the farm should adjust to the level of the market wage, and should therefore be independent of the household's ownership of tradable assets or whether the household members farm or only work for wages. However, when a household faces an unexpected ration on the labor market in the sense that the household's desired labor supply exceeds the available off-farm wage opportunities plus on-farm labor demand *at the market wage* (Benjamin 1992), then it may have little choice but to allocate its excess labor to activities where the shadow price of labor is beneath the prevailing (disequilibrium) wage. The marginal product of labor will, in this situation, be shaped by the household's ownership of assets.[17]

For example, a household with land may respond by intensifying the use of family labor in cultivation beyond the point where the marginal product of labor equals the market wage. This might include bringing previously unused low quality land or garden

[16] For example 89 households who had worked as agricultural wage laborers had no ag-wage employment by 1997, but 54 households that had not had ag-wage jobs gained this status, for a net loss of 35 households. The net gain of households who took up some self-employment in 1997 was 68. The net loss of non-ag wage households was 9. Note, however, that many other households reduced their ag- and non-ag-wage hours.

[17] Amartya Sen would perhaps add that in it is not just physical, but also social and political capital that may determine a household's vulnerability in such situations of market incompleteness, as these endowments shape participation in, and entitlements from local and national safety nets (Sen 1982).

plots into operation. Landless households may have few options other than to enter into low productivity self-employment activities such as petty crafts, small trading, or begging.[18]

To see this algebraically, suppose that once it has been chosen at the start of the agricultural season, a households' land-use decision, T_i, cannot be altered, while household labor supply $\overline{L_i}(w)$ can be re-adjusted to equate the expected real wage and the marginal rate of substitution between leisure and consumption. With full labor markets income in household *i* is factor income plus any farm profits plus all other income sources captured in B_i.

$$\begin{aligned} Y_i &= F(T_i, L_i) - w(L_i - \overline{L_i}(w)) - v(T_i - \overline{T_i}) + B_i \\ &= \Pi(w, v) + w\overline{L_i}(w) + v\overline{T_i} + B_i \end{aligned} \tag{1}$$

When the labor market is functioning smoothly, household labor supply will be adjusted until the shadow price of labor in self-employment activities is adjusted to the market wage. The shadow price of labor equals the market wage, $dY_i / d\overline{L_i} = w$. Suppose instead now that the household is suddenly faced by an unexpected ration in the labor market that limits it to selling no more than $\underline{L} < \overline{L}(w)$ hours at the market wage. If farm production is the only outlet for surplus labor, household income can now be written as:

$$Y_i = F(T_i, L_i(w) - \underline{L}) - vT_i + w\underline{L} + v\overline{T_i} + B_i$$

The shadow price of labor is now given by $dY_i / d\overline{L_i} = F_L(T_i, L_i(w) - \underline{L})$. Under the maintained assumption that land remains unadjusted at T_i, the shadow price of labor will now depend on the size of the ration and the household's ownership of land.[19] In this simple model, the shadow wage in households without access to any land would be zero. More realistically, it would equal to the marginal product of labor in last-resort self-

[18] On the other hand, landless households may be located closer to towns or markets and therefore have a larger market for their self-employment activities.

[19] The assumption that households cannot make short-run adjustments on the land market does not seem extreme. It seems unlikely for instance that a landless that suddenly finds itself unable to sell as much

employment activities. This would itself in turn be affected by the households' ownership of other productive assets such as a sewing machine, a bicycle or a vehicle.

Other simple predictions follow. A fall in the wage rate will increase the amount of time spent on home production. An increase in unearned income such as remittances from abroad should leave it unaffected except for wealth effects. Human capital also helps households adapt to changing economic circumstances and seize new opportunities. This observation, often attributed to Theodore Schultz (1964), has been confirmed by many empirical studies. Education will of course also prove to be valuable in explaining households' ability to protect income against a downturn to the extent that opportunities and wages for educated workers are expanding faster than those for uneducated workers.[20]

The main testable implication of this simple model is that when labor markets are tight, the marginal product of household labor time ought to be independent of the household's asset position, whereas when labor markets are disrupted and the household faces a ration, the marginal product should be affected by the households' ownership of land and non-land assets. We can test for this, and measure the strength of such possible effects, by examining how the return to household labor changes in 1997 compared to 1995 in household groups with different asset ownership.

There are limitations to implementing this approach empirically, however. Identification is complicated by the fact that the dataset does not provide a household-level measure of whether or not a household faces a labor ration, and if it does, how many more hours that household would have liked to have sold at the prevailing wage.[21]

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labor as it had hoped on the labor market could easily rent in land to equalize the marginal product of labor to the market wage because of credit constraints or the lack of nearby land.

[20] Larde and Arguello (1999) used 1997 household information of the same dataset to perform a cross-section analysis that highlights the role of education in explaining a household's level of 'integration' into 'market' activities, and used this in turn to explain household income generation. One key methodological difference between our studies, aside from our panel focus, is that we consider the value of home production of products that could be bought on the market as income. Larde de Palomo's study confirms that education is an important determinant of a household's probability of holding wage employment and/or of producing a marketable surplus.

[21] In the 1998 survey, 32 percent of the 938 economically individuals in 494 households that declared themselves to be economically active replied yes to questions that suggested that they had searched for but not found as many hours work as they would have liked to at the going wage, or that they had become

Nor do we have a direct measure of the monetary impact of any production shocks to individual farm plots or other self-employment activities.[22] More generally, the great diversity of livelihood strategies and occupational choices employed by the 494 rural households in the sample and the apparent mix of price and non-price rationing elements in their economic environment make it difficult to specify and identify a full structural economic model of income vulnerability. The reduced form approach below should therefore be thought of primarily as a somewhat more elaborate analysis of the correlates and determinants of poverty and vulnerability than the poverty decompositions above,[23] and as a suggestive, but imperfect, test of the hypothesis that asset ownership helps households to buffer against labor market shocks.

Econometric Implementation

Our econometric model specifies income per capita Y_{it} (excluding remittances, subsidies and transfers) in each year as reduced form functions of the form:

$$Y_{i97} = \alpha_{97} + \beta_{97} L_{i97} + \theta_{97} T_{i97} + \gamma_{97} T_{i97} \cdot L_{i97} + \mu_i + \varepsilon_{i97},$$

$$Y_{i95} = \alpha_{95} + \beta_{95} L_{i95} + \theta_{95} T_{i95} + \gamma_{97} T_{i95} \cdot L_{i95} + \mu_i + \varepsilon_{i95},$$

where L_{it} measures the household adult labor force, and T_{it} is a vector of household asset variables including the value of the households' land endowment, the average level of adult schooling in the household (as a measure of human capital), and physical assets as measured by the value of farm machinery and livestock, and whether the household owns a car, a sewing machine, or a bicycle. The μ_i are household specific time-invariant unobserved effects (such as intrinsic skill or entrepreneurial drive, which can be correlated to some of the L_{it}'s and T_{it}'s) and the ε_{it} are household-specific, time-variant shocks (assumed not to be correlated with the L_{it}'s and T_{it}'s). Parameter β_{95} would measure the shadow wage of labor, and the θ_{95} parameters would measure the shadow

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discouraged from searching. A directly comparable set of questions was, unfortunately, not available for the earlier round.

[22] In the first survey round households declared 'less than normal' harvests on 44 percent of their plots, whereas in the second survey the number had risen to 59 percent. The survey does not indicate the calculated monetary cost any shocks or losses.

return to land and other owned assets. The vector parameter γ_{95} measures the average *impact* of asset ownership on the shadow wage.

Suppose, as is our hypothesis, that the 1995-96 season featured a vigorous labor market in which most households sold as much labor as they would have liked at the prevailing wage. In such circumstances we would expect $\gamma_{95} = 0$, since the household is able to adjust household labor supply to each self-employment activity (that utilizes land and other owned assets) until the marginal product of labor in each activity is equal to the market wage.[24] Human capital must be treated somewhat differently than other assets. Since human capital is typically bundled together with labor time, and cannot be easily rented on its own, we assume that it only enters the equations interacted with household labor, and that γ_{95} will generally be positive since human capital affects the wage, even when the labor market is tight.

On the other hand, in a year such as 1997, during which time we hypothesize that the market for farm and non-farm wage labor was disrupted by the weather and other aggregate demand shocks, asset ownership may play a role in determining the shadow price of household labor and the elements of γ_{95} would be expected to be positive. For example a household that loses a job in the wage sector but owns a sewing machine may be able to put that sewing machine into more intensive use to generate self-employment income.

The regression results presented in Table 7 below support many of these hypotheses. We estimated the model using both random-effects and fixed-effects estimators. As is well known, random-effects estimates will be biased if the unobserved effects μ_i are correlated with any of the observed explanatory variables. However, a Hausman specification test could not reject the null that the random effects and fixed effects estimates are equal which suggests that this type of bias is not a significant concern in

[23] Our approach is in this respect very similar to Glewwe and Hall's (1998) study of household vulnerability to macroeconomic shocks in Peru.

[24] Farm profits in household income equation (1) would be independent of household endowment of tradable assets, so an marginal increase in the households' endowment increases income only by its impact on factor income.

this model. Since the random-effects estimator is more efficient, and it allows us to estimate coefficients on time invariant variables that are of interest, we have opted to report the random-effects estimator. Four regional dummies were included in all models but were omitted from the tables for clarity of presentation.[25]

As can be seen in the table, land ownership had a positive direct effect on household income and a negative effect on labor productivity in 1995, while in 1997 it had exactly the opposite effects, i.e., a negative direct effect on income and a positive effect on labor productivity (all significant at the 5% level, except for the 1997 impact on labor productivity, which is significant at the 1% level). The positive and statistically significant impact of land ownership on labor productivity in 1997 is consistent with the interpretation that households were forced to fall back onto farm self-employment activities. The negative interaction effect in 1995 seems somewhat puzzling at first, although it is conceivable that if property rights to land are insecure and time spent enforcing land rights affects labor market participation, land ownership could adversely affect the shadow price of labor even in a tight labor market. Given the recent history of conflict and widespread squatting, and incomplete titling, this is a distinct possibility in many parts of rural El Salvador (Shaw 1998).

The effect of owning a sewing machine and a bicycle are also consistent with our hypothesis that households became more autarkic in 1997. When labor markets were strong in 1995 owning either of these two assets did not significantly affect the shadow wage of an adult household member, yet in 1997 the estimated effect is positive and significantly different from zero at the 1% and 5% levels. Perhaps bicycles helped household members search for temporary jobs, or bring wares to market, when labor markets were thinner in 1997.[26]

Somewhat surprisingly, however, farm machinery and livestock ownership had no significant direct or interaction impact on income for either 1995 or 1997. Ownership of

[25] Although none of the coefficients were statistically significant, their signs are consistent with the reported effects of El Niño, namely that disruptions were more pronounced in the Eastern part of the country (Angel 1998).

a car had significant direct and indirect effects on income, but the signs are not consistent with our conceptual story. Conceivably, the *demand* for vehicle services, and hence the return to this activity, is higher in a tight labor market (e.g. more paid rides to transport workers to and from work on coffee plantations).

As expected, the impact of average adult schooling on labor productivity is positive and significantly different from zero at the 1% level in both years.[27] While it remains true that better educated households were better able to cope with an economic downturn (they were more likely to hold onto their jobs for one) the impact of education on labor productivity declines with the disruption of the of labor market in 1997 (we can reject the null hypothesis that the coefficients are the same in both years at the 10% level).[28] This suggests that education has a greater marginal impact in helping workers to boost their wages when the demand for labor is high, and a lower impact on shadow wages when household workers are self employed.

Protecting human capital investments -- School enrollments

Several researchers have observed that when markets are incomplete households may respond to unexpected income shocks by reducing the rate of investment in human capital (Jacoby and Skoufias 1997). In developing countries, where financial markets are thin or even missing, this impact can be costly both to households and to society. A testable implication of financial market completeness is that investments in human capital should not be responsive to a household's current asset position, since investments in education should depend on future expected returns. When markets are incomplete, however, a household's ability to protect investments in human capital accumulation may depend on its ability to dissave out of accumulated assets, and on its access to credit and safety nets.

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[26] Sewing machine and bicycle ownership dummies were also included without interactions in a longer model, but had no significant direct impacts on income at either the 10 or 5% levels.

[27] As discussed above, there is no compelling reason to include schooling by itself in the regression since education is always bundled with labor time. Nevertheless, we included it in the long regression model and, as expected, it had no significant direct impact on income.

[28] This rejection can be seen in Table B where the same regression results are presented with the shift parameters for the difference between 1997 and 1995 instead of the whole parameters for both years.

An evaluation of the responsiveness of school enrollment rates to exogenous shocks is of interest particularly because the Salvadoran government has made education a high priority for social investment in recent years. The educational reforms that have been carried out are supposed to improve the targeting of resources to poor areas and provide incentives for parents to keep children in school. Aggregate pre-school, primary, and secondary education enrollments have risen steadily since the end of the war (Sawada and Jimenez 1998).

In this section we examine how household characteristics such as ownership of assets and access to remittances affected the way different households adjusted their rate of human capital accumulation in response to economic events. We specify school enrollment rate equations for different school age categories as functions of household characteristics and a unobserved random disturbance. The school age categories considered are: elementary (ages 5-11), primary (ages 12-15), and secondary (ages 16-18). We assume a linear relation between school enrollment and household and environmental characteristics:

$$S_{it} = \beta' X_{it} + \gamma' Z_i + \varepsilon_{it}, \quad (1)$$

where S_{it} is the ratio of enrolled children to the total number of children in the respective school age category (e.g., for the elementary enrollment equation, S_{it} is the household's proportion of children older than 4 and younger than 12 enrolled in elementary school). X_{it} and Z_i are time-variant and invariant household characteristics, and ε_{it} are unobserved disturbances. Because S_{it} is bounded between 0 and 1, we estimate (1) via a two-limit Tobit procedure. Estimation results are presented in Table 8.[29]

The results indicate that, all else being equal, the 1997 events that affected rural income and employment appear not to have caused a major change in the response of enrollment rates to household characteristics. As we cannot reject the null hypotheses that

[29] Since for each enrollment equation we only include households with children in the relevant age group, sample selection biases may be a problem, given that the presence of children in each age category is likely to be endogenous. However, we expect the biases to be small for the elementary and primary enrollment equations, since fertility decisions were made long before the observed income shocks and the children in these groups are less likely to leave the household because of the shocks. The biases, however, might be stronger in the secondary enrollment equation because at this age (16-18) the young are more likely to respond to income shocks by leaving the household (e.g., because of marriage or migration).

the coefficients for the variables interacted with the 1997 dummy variables are jointly equal to zero at the conventional levels of statistical significance, we analyze a more parsimonious specification without interactions.

Nonetheless, the estimated coefficients for the remaining variables do indicate that several household-specific characteristics affect school enrollment. Schooling of the head of the household is the most important determinant of enrollment rates of children in all age groups, particularly for children between 12 and 18 years of age. The smaller effect on younger children suggests that parents of all educational backgrounds consider primary education to be important, and/or that education reform and school-lunch programs are providing incentives for parents to keep their children in school.

Most interestingly land ownership appears as a positive and significant variable affecting enrollment rates in all school age groups. Land ownership has a positive impact on enrollment even when income per capita is included as explanatory variable.[30] This result may indicate that land ownership is associated with greater supply of education, perhaps because land owning communities are more likely to take the necessary collective action to bring about greater supply of educational services, or because the government is targeting rural areas. Another explanation may be that households that farm their own plots may have more flexibility in shifting children's work between farm work and study than can households that derive income primarily from off-farm employment and wage labor.[31] Although our reduced form framework cannot identify the channel by which land ownership affects enrollment, the results suggest that a more egalitarian distribution of land could have a significant impact on human capital accumulation.

Not surprisingly, a household's distance from the relevant school has a negative impact on enrollment rates, particularly at the primary and secondary level. This suggests that supply side interventions, such as building rural schools and lowering

[30] Regression results without income in the right hand side also indicate that land ownership has a positive impact on enrollment rates.
[31] Yet another explanation is that land ownership translates into better access to credit to finance children's education. Galor and Zeira (1993) is a well known growth model built upon this assumption.

transport costs to students, could have a significant impact on the rates of investment in human capital. Finally, the results also indicate that household size has a negative effect on enrollment.

Conclusion

Rural households in developing countries are not only typically more poor compared to their urban counterparts, they also tend to manage more volatile income streams, in increasingly more liberalized markets. This paper reveals the very high variability of rural incomes in El Salvador in the late nineties and identifies some important correlates of poverty and vulnerability.

Several policy conclusions may be suggested from the analysis. Improving household access to secure and low transaction cost financial savings and credit services are obviously important for providing households with risk coping instruments less costly than the strategies that households are now forced to deploy. Broadening asset ownership and giving smallholders more secure title to land may also play a role. Policies to boost and protect school enrollment via targeted subsidies or by reducing the cost and travel time of getting to school may also help to mitigate one of the more direct impacts of economic downturns.

It has become fashionable in recent policy discussions to emphasize the role of non-farm self-employment activities in rural household income generation. Our study amply confirms the importance of this income source, but it also suggests the very fluid ways in which households juggle their time between different types of employment activities.[32] Some Salvadoran policymakers and observers have expressed concern at the apparent limited market insertion of rural Salvadoran households that have 'retreated' into self-sufficiency in the nineties and following land distributions. They argue for increasing households' 'insertion' into the market by increasing the availability or productivity of non-farm self-employment activities and non-farm wage employment. These are surely welcome measures and will help raise and diversify household incomes, but it should not

[32] On this point, see the recent symposium issue of World Development by Reardon and Berdegue (2001).

be forgotten that raising productivity on small-farms can just as surely raise incomes and insert households into the market.

Farm and non-farm self-employment activities both serve important roles as long-term income generating activities and as fallback options for many rural households when more lucrative wage employment opportunities fail. That land ownership appears to protect the marginal return to labor when households fall back on farm self-employment activities suggests the value of broadening access to land, but also suggests that land and credit markets may not be working properly to help households adjust to shocks.

Given the significant impact of the loss of wage employment on rural poverty and welfare, and the heavy deficit of infrastructure investments in rural areas, it seems possible that a social fund approach to infrastructure investment programs might be designed to also provide a safety net for vulnerable families. For example, simple temporary public works employment programs could be targeted in bad years to households or geographic communities that depend on agricultural wage employment. A great many countries have had success at implementing such programs in an efficient and decentralized fashion (Grosh 1994). Programs that offer less than the minimum agricultural wage are self-targeting and typically short-lived. Although we have not done so in this paper it is a straightforward exercise to measure by how much poverty could have been reduced within a given budget with such a program.

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Table 1: Household income per capita
(including remittances, 1997 colones)

Income per Capita					
	1995		1997		percent
Quintile	mean	s.d	mean	s.d	change
1	1367	(1467)	924	(2111)	-32.4%
2	2125	(1421)	1746	(1334)	-17.9%
3	2966	(1329)	2780	(1486)	-6.3%
4	4243	(1844)	4210	(2758)	-0.8%
5	9835	(7712)	9830	(10751)	-0.1%
Total	4098	(4763)	3888	(5997)	-5.1%
Household Income					
	1995		1997		percent
Quintile	mean	s.d	mean	s.d	change
1	9236	(9217)	6039	(7405)	-34.6%
2	13122	(8487)	11067	(10030)	-15.7%
3	17546	(10768)	18016	(11984)	2.7%
4	23333	(13111)	24849	(19470)	6.5%
5	41554	(32781)	44659	(41844)	7.5%
Total	20923	(20693)	20884	(25712)	-0.2%

Note: Households are classified into income quintiles by average predicted income per capita (not including remittances). Income reported in the table includes remittances.

Table 2: Remittances contribution to income, 1997 colones.

Quintile	% of households receiving		% income for receiving HHs		% of quintiles' income	
	1995	1997	1995	1997	1995	1997
1	23.2%	29.3%	52.1%	49.1%	12.1%	14.4%
2	20.2%	22.2%	31.4%	36.0%	6.3%	8.0%
3	20.4%	20.4%	36.5%	38.2%	7.5%	7.8%
4	12.1%	20.2%	17.8%	29.4%	2.2%	5.9%
5	16.3%	16.3%	21.3%	20.8%	3.5%	3.4%
Total	18.5%	21.7%	34.2%	36.5%	6.3%	7.9%

Table 3: Hours worked in Wage Labor and Self-Employment

1996	Total Hours	Number Households	Hours per Household
Total Hours	**1997532**	**494**	**4044**
Wage Labor Hours	*1195952*	*413*	*2896*
Agricultural labor	545304	261	2089
Non Ag. labor	650648	238	2734
Self-Employment	*801580*	*303*	*2645*
Agricultural labor	682404	283	2411
Non Agricultural	119176	43	2772
1998			
Total Hours	**2123795**	**494**	**4299**
Wage Labor Hours	*967715*	*362*	*2673*
Agricultural labor	413527	223	1854
Non Ag. labor	554188	214	2590
Self-Employment	*1156080*	*364*	*3176*
Agricultural labor	860921	327	2633
Non Agricultural	295159	108	2733
change			
Total Hours	**126263**	**0**	**256**
Wage Labor Hours	*-228237*	*-51*	*-223*
Agricultural labor	-131777	-38	-235
Non Ag. labor	-96460	-24	-144
Self-Employment	*354500*	*61*	*531*
Agricultural labor	178517	44	221
Non Agricultural	175983	65	-39
percent change			
Total Hours	**6%**	**0%**	**6%**
Wage Labor Hours	*-19%*	*-12%*	*-8%*
Agricultural labor	-24%	-15%	-11%
Non Ag. labor	-15%	-10%	-5%
Self-Employment	*44%*	*20%*	*20%*
Agricultural labor	26%	16%	9%
Non Agricultural	148%	151%	-1%

Table 4: Poverty Profiles and decompositions 1995-1997

FGT(0)	**1995**			**1997**			Contribution toward change in poverty:			
HEADCOUNT RATIO	*n95i*	*P95i*	share	*n97i*	*P97i*	share	Total	Sectoral	Popn. Shift	interaction
001. Self-employed only	0.152	0.678	0.161	0.220	0.757	0.242	126%	23.8%	91.8%	10.8%
010. Non-ag wage only	0.138	0.450	0.097	0.096	0.552	0.077	-18%	27.9%	-37.5%	-8.5%
011. Non-ag wage + Self	0.164	0.471	0.121	0.190	0.481	0.133	28%	3.1%	24.9%	0.5%
100. Ag wage only	0.134	0.854	0.180	0.087	0.903	0.114	-72%	13.0%	-80.1%	-4.6%
101. Ag wage + Self	0.216	0.830	0.282	0.231	0.893	0.299	52%	26.7%	23.4%	1.8%
110. Ag wage + non-ag wage	0.099	0.410	0.064	0.064	0.563	0.052	-9%	29.9%	-28.5%	-10.6%
111. Ag & non-ag wage + Self	0.097	0.626	0.096	0.113	0.507	0.083	-8%	-22.8%	18.9%	-3.6%
Total	1.000		**0.638**	1.000		**0.688**	100.0%	101.4%	12.9%	-14.3%

FGT(1)	**1995**			**1997**			Contribution toward change in poverty:			
POVERTY GAP	*n95i*	*P95i*	share	*n97i*	*P97i*	share	Total	Sectoral	Popn. Shift	interaction
001. Self-employed only	0.152	0.431	0.203	0.220	0.532	0.302	79%	23.3%	45.0%	10.6%
010. Non-ag wage only	0.138	0.166	0.071	0.096	0.251	0.062	2%	17.7%	-10.7%	-5.4%
011. Non-ag wage + Self	0.164	0.222	0.113	0.190	0.235	0.115	13%	3.3%	9.0%	0.5%
100. Ag wage only	0.134	0.403	0.168	0.087	0.407	0.091	-29%	0.7%	-29.1%	-0.2%
101. Ag wage + Self	0.216	0.482	0.324	0.231	0.570	0.339	41%	29.1%	10.5%	1.9%
110. Ag wage + non-ag wage	0.099	0.146	0.045	0.064	0.201	0.033	-2%	8.3%	-7.8%	-2.9%
111. Ag & non-ag wage + Self	0.097	0.251	0.076	0.113	0.196	0.057	-4%	-8.2%	5.8%	-1.3%
Total	1.000		**0.322**	1.000		**0.388**	100.0%	74.2%	22.7%	3.1%

Table 4 (continued): Poverty Profiles and decompositions 1995-1997

FGT(2)	1995			1997			Contribution toward change in poverty:			
SQUARED POVERTY GAP	*n95i*	*P95i*	share	*n97i*	*P97i*	share	Total	Sectoral	Popn. Shift	interaction
001. Self-employed only	0.152	0.341	0.282	0.220	0.501	0.387	76%	31.5%	30.5%	14.3%
010. Non-ag wage only	0.138	0.086	0.051	0.096	0.145	0.049	2%	10.4%	-4.8%	-3.2%
011. Non-ag wage + Self	0.164	0.135	0.099	0.190	0.150	0.100	8%	3.2%	4.7%	0.5%
100. Ag wage only	0.134	0.225	0.170	0.087	0.237	0.072	-12%	2.2%	-13.9%	-0.8%
101. Ag wage + Self	0.216	0.337	0.339	0.231	0.410	0.332	28%	20.6%	6.3%	1.4%
110. Ag wage + non-ag wage	0.099	0.061	0.021	0.064	0.093	0.021	0%	4.1%	-2.8%	-1.5%
111. Ag & non-ag wage + Self	0.097	0.136	0.039	0.113	0.098	0.039	-3%	-4.8%	2.7%	-0.8%
Total	1.000		**0.208**	1.000		**0.285**	100.0%	67.3%	22.8%	10.0%

Table 5: Movement across occupational status

Movement across labor categories

1995 category	**1997 Category**							
	001	**010**	**011**	**100**	**101**	**110**	**111**	
001. Self-employed only	52	1	9	2	10	1	4	79
010. Non-ag wage only	3	26	29	2	6	4	1	71
011. Non-ag wage + Self	18	9	26	0	13	4	7	77
100. Ag wage only	10	4	7	17	28	4	5	75
101. Ag wage + Self	28	1	6	13	37	6	8	99
110. Ag wage + non-ag wage	3	5	6	8	4	8	9	43
111. Ag & non-ag wage + Self	9	2	8	2	6	2	12	41
Total	123	48	91	44	104	29	46	485

Note: categories defined as in Table 4. The numbers exclude 9 households that had no labor market insertion in 1997.

Table 6: Household's self-declared emergency coping mechanisms, 1997

Which of the following could you use to handle possible emergencies:		
Options read by interviewer	**Number responses**	**% of HH responding**
Stored cash	115	18.5%
A savings account at a bank	83	13.3%
Savings in a cooperative	6	1.0%
Animals can sell	152	24.4%
Grain stored	90	14.5%
Credit card	0	0.0%
Other recorded answers:		
Would sell land or house	10	1.6%
Would sell something else	4	0.6%
Has other cashflows	4	0.6%
Would seek help from relatives	31	5.0%
Would Borrow	146	23.5%
Has nothing	100	16.1%

Notes: 622 households were interviewed. Households could give more than one answer.

Table 7: Random-effects Estimation of Household Income Equation

(Dependent variable: Household earned income in 1997 Colones)

	1995 Coefficients	*1997 Coefficients*
HH adult population (N)	1,085.60	1,111.19
	(657.18)***	(607.31)***
Land owned in Manzanas (T)	876.89	-747.41
	(431.93)**	(367.20)**
N x T	-275.89	386.46
	(124.46)**	(134.21)*
Value of Farm Machinery (M)	-0.60	0.12
	(2.16)	(0.47)
N x M	0.21	0.02
	(0.54)	(0.07)
Value of Livestock (L)	0.12	0.36
	(0.15)	(0.30)
N x L	0.05	-0.09
	(0.05)	(0.08)
Cars owned (C)	-17,271.49	31,597.54
	(10,920.56)	(8,784.17)*
N x C	6,800.25	-4756.96
	(2,776.32)**	(2.006.93)**
N x Average adult schooling in years	589.20	343.45
	(94.79)*	(87.65)*
N x own sewing machine dummy	195.54	1722.30
	(646.85)	(586.40)*
N x own bicycle dummy	963.66	1316.34
	(639.52)	(559.37**)
Constant	7,157.75	1,757.75
	(2,619.01)*	(2.619.01)*
Observations	978	978
Number of hhid	488	488
R-square: within		0.1513
between		0.3773
overall		0.2940
Hausman specification test: χ^2(d.f.)		75.31(28)

Standard errors in parentheses: *** significant at 10%;** significant at 5%;* significant at 1%.

Table 8: Tobit estimation of enrollment equations

	AGE GROUPS											
	16 to 18 years				12 to 15 years				5 to 11 years			
EXPLANATORY VARIABLES	***Coeffic.***	***t-ratio***	***Coeffic.***	***t-ratio***	***Coeffic.***	***t-ratio***	***Coeffic.***	***t-ratio***	***Coeffic.***	***t-ratio***	***Coeffic.***	***t-ratio***
1997 dummy (D97)	0.138	1.96	0.174	0.29	-0.579	-0.13	0.452	1.10	-0.310	-0.22	-0.945	-0.73
HH's head years of schooling (ED)	0.497	2.99	0.489	3.58	0.483	3.50	0.397	3.95	0.044	1.33	0.060	2.39
D97 x ED	-0.025	-0.12			-0.173	-1.02			0.044	0.86		
Female headed HH dummy (DF)	0.562	0.39	0.638	0.61	-0.015	-0.01	0.301	0.39	0.152	0.41	-0.051	-0.20
D97 x DF	-0.085	-0.04			0.806	0.53			-0.412	-0.81		
Land owner dummy (DL)	2.502	2.22	3.368	3.57	0.710	0.99	0.927	1.72	0.772	3.07	0.662	3.64
D97 x DL	1.857	1.21			0.514	0.49			-0.252	-0.71		
Log-manzanas Owned (L)	0.246	0.73	0.558	2.08	-0.179	-0.73	0.128	0.70	0.032	0.34	0.038	0.58
D97 x L	0.587	1.16			0.703	1.85			0.004	0.03		
Close relatives living abroad (Mig)	0.493	1.09	-0.007	-0.02	-0.056	-0.17	-0.145	-0.67	0.042	0.38	0.082	0.95
D97 x Mig	-0.829	-1.20			-0.206	-0.46			0.120	0.68		
Female workforce (FW)	1.484	2.94	0.897	2.46	0.398	1.17	0.302	1.25	0.061	0.53	0.085	0.91
D97 x FW	-0.990	-1.74			-0.278	-0.67			0.064	0.45		
Male Workforce (MW)	0.297	0.73	0.307	0.96	-0.032	-0.11	0.024	0.11	0.172	1.48	0.095	1.09
D97 x MW	-0.241	-0.46			0.063	0.16			-0.143	-1.03		
HH's head aged in 1995 (Age95)	0.088	2.31	0.029	1.07	0.018	0.72	0.024	1.18	-0.002	-0.24	0.000	0.04
D97 x Age95	-0.122	-2.16			0.027	0.64			0.003	0.28		
Distance to primary or secundary school (DS)	-0.092	-1.21	-0.084	-1.54	-0.379	-1.72	-0.473	-2.91	-0.015	-0.21	-0.015	-0.32
D97 x DS	0.001	0.01			-0.169	-0.57			-0.005	-0.05		
Log-income per capita (Y)	0.288	0.53	-0.117	-0.28	-0.131	-0.32	-0.074	-0.25	0.222	1.73	0.190	1.53
D97 x Y	-0.615	-0.80			0.136	0.24			0.081	0.44		
HH members in school age group	0.049	0.08	-0.213	-0.34	-0.239	-0.70	-0.243	-0.70	0.021	0.24	0.020	0.22
Household size (N)	-0.284	-1.91	-0.314	-2.07	-0.178	-1.55	-0.196	-1.69	-0.106	-2.05	-0.103	-2.00
Intercept	-0.114	-2.16	-3.550	-0.95	2.190	0.64	2.162	0.85	-0.537	-0.53	-0.314	-0.32
sigma	4.4201		4.55179		3.24343		3.28619		1.28168		1.28644	
Number of observations	394		394		437		437		576		576	
Log likelihood	-315		-322		-343		-346		-507		-508	