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REMITTANCES, POVERTY, AND INVESTMENT IN GUATEMALA

Richard H. Adams, Jr.

Introduction

In the developing world, internal and international migrants tend to remit or send a sizeable portion of their increased income earnings to families back home. Yet despite the ever-increasing size of these internal and international remittances,[1] little attention has been paid to analyzing the impact of these financial transfers on poverty and investment in the developing world. Three factors seem to be responsible for this lacuna. The first is an absence of remittances data: few household surveys collect useful data on the size of remittance transfers to households in origin communities. The second is a lack of poverty data: it is quite difficult to estimate accurate poverty levels in developing countries. The final factor relates to how remittances are spent or used. In the past, many researchers and policy makers have assumed that households spend most of their remittance income on consumption, with only a small fraction of such income being spent on investment.[2]

This chapter analyzes the impact of internal and international remittances on poverty and investment in one developing country: Guatemala.[3] Guatemala represents a good case study because it produces a large number of internal migrants (to urban areas) and international migrants (to the United States). The presence of a new, detailed nationally representative household survey in Guatemala makes it possible to analyze the impact of these two types of remittances in that country.

At the outset, it should be noted that any effort to examine the impact of remittances (internal or international) on poverty and investment involves several important methodological issues. On the one hand, it is possible to treat remittances as a simple exogenous transfer of income by migrants. When treated as an exogenous transfer, the economic question is as follows: How do remittances, in total or at the margin, affect the observed level of poverty or investment in a

developing country?[4] On the other hand, it is also possible to treat remittances as a potential substitute for domestic (home) earnings. When treated as a potential substitute for home earnings, the economic question is as follows: How does the observed level of poverty or investment in a country compare with a counterfactual scenario without migration and remittances but including an imputation for the home earnings of migrants had those people stayed and worked at home? This latter treatment seems to represent the more interesting (and challenging) economic question because it compares poverty and investment in a country with and without remittances.[5]

One of the unique contributions of this chapter is that it develops counterfactual income estimates for migrant and nonmigrant households by using econometric estimations to predict the incomes of households with and without remittances. However, this approach has its own methodological difficulties. Most notably, the attempt to predict (estimate) the incomes of migrant households on the basis of the observed incomes of nonmigrant households becomes problematic if the two groups of households differ systematically in their expected incomes. In other words, if migrant and nonmigrant households differ systematically in their characteristics, there will be selection bias in any estimates of income that are based on nonmigrant households. To test for this possible selection bias, this chapter employs a Heckman-type selection correction procedure, where the selection rules model the decision of the household to produce migrants and receive remittances using a multinomial logit-ordinary least squares (OLS) two-stage estimation of income.

The chapter includes eight sections. The first section presents the data set. The second and third sections operationalize and estimate a two-stage Heckman-type selection model to test for sample selection bias. The results of these sections suggest that the subsample of nonmigrant households is randomly selected from the population and that therefore the bias resulting from estimating predicted income equations using OLS without selection controls would be small. The fourth and fifth sections discuss how counterfactual income estimates for households can be developed by using predicted income equations to identify the incomes of households with and without remittances. These sections find that both internal and international remittances reduce the level, depth, and severity of poverty in Guatemala. Turning to the analysis of how remittances are spent or used, the sixth and seventh sections develop and estimate a model for examining the marginal expenditure patterns of households on consumption and investment. The results show that at the margin households receiving remittances spend less on consumption goods—food—and more on investment—education and housing—than do households receiving no remittances. The final section summarizes the main findings.

Data

Data for the study come from a national household survey conducted by the Instituto Nacional de Estadistica in Guatemala (INEG) during the period July to December 2000.[6] The survey included 7,276 urban and rural households and was designed to be statistically representative at the national level and for urban and rural areas. The survey was comprehensive, collecting detailed information on a wide range of topics, including income, expenditure, education, financial assets, and remittances.[7]

It should, however, be emphasized that this survey was not designed as a migration or remittances survey. In fact, the survey collected limited information on these topics. With respect to migration, the survey collected no information on the characteristics of the individual migrant: age, education, income earned outside the home, or length of time away. This means that no data are available on the characteristics of migrants—either remitting or nonremitting migrants—who are currently living outside of the household. With respect to remittances, the survey only asked three basic questions: (a) Does your household receive remittances from family or friends? (b) Where do the people sending remittances live?[8] and (c) How much (remittance) money did your household receive in the past 12 months? While the lack of data on individual migrant characteristics is unfortunate, the presence of detailed information on household income and expenditure makes it possible to use responses to these three questions to examine the impact of remittances on poverty in Guatemala.

Table 2.1 presents summary data from the survey. This table shows that 5,665 households (77.8 percent of all households) received no remittances, 1,063 households (14.6 percent) received internal remittances (from Guatemala), and 593 households (8.1 percent) received international remittances (from the United States). According to the data, 88 households received internal and international remittances and these 88 households are counted in both columns of remittance-receivers in table 2.1.[9]

The data in table 2.1 reveal several interesting contrasts among the three groups of households, that is, those receiving no remittances, those receiving internal remittances (from Guatemala), and those receiving international remittances (from the United States). On average, when compared with nonremittance households, households receiving remittances (internal or international) have more members with secondary education, older household heads, fewer children under age 5, and more wealth (value of house). In a broad sense, these findings tend to accord with human capital theory, which suggests that educated people are more likely to migrate because educated people enjoy greater employment and income opportunities in destination areas.

TABLE 2.1 Summary Data on Nonremittance Households and Remittance-Receiving Households, Guatemala, 2000

Variable	Receive no remittances	Receive internal remittances (from Guatemala)	Receive international remittances (from the United States)	t-test (no remittances versus internal remittances)	t-test (no remittances versus international remittances
Human Capital					
Number of members over age 15 with primary education	1.18 (1.11)	1.08 (1.15)	1.18 (1.13)	3.51**	—
Number of members over age 15 with secondary education	0.46 (0.85)	0.59 (0.94)	0.69 (1.06)	−4.67**	−7.32**
Number of members over age 15 with university education	0.15 (0.52)	0.17 (0.55)	0.14 (0.46)	−2.54**	−0.19
Parents' education					
Father's years of schooling	4.46 (4.32)	3.88 (4.23)	4.05 (4.09)	3.14**	0.96
Mother's years of schooling	3.40 (3.97)	3.40 (4.22)	3.58 (3.88)	—	3.30**
Household Characteristics					
Age of household head (years)	42.74 (14.24)	50.96 (16.66)	48.34 (16.12)	−17.03**	−9.32**
Household size	5.32 (2.46)	4.74 (2.69)	5.18 (2.68)	6.50**	0.52

Number of males over age 15	1.35	1.19	1.21		
	(0.84)	(0.98)	(1.00)	6.67**	3.52**
Number of females over age 15	1.42	1.59	1.65		
	(0.80)	(0.91)	(0.92)	−7.18**	−7.73**
Number of children under age 5	0.88	0.62	0.69		
	(0.96)	(0.89)	(0.96)	8.14**	5.49**
Networks					
Head of household is nonindigenous	0.59	0.67	0.68		
(1 = yes)	(0.49)	(0.47)	(0.46)	−5.62**	−5.86**
Wealth					
Value of house (quetzals)	3,906.08	4,802.16	4,691.63		
	(7,963.60)	(7,364.90)	(5,840.0)	−4.82**	−3.69**
Area					
Area (1 = urban, 2 = rural)	1.58	1.49	1.52		
	(0.49)	(0.50)	(0.49)	6.51**	5.02**
N	5,665	1,063	593	—	—

Source: ENCOVI 2000.

Note: N = 7,276 households; 88 households receive both internal remittances (from Guatemala) and international remittances (from the United States). All values are weighted; standard deviations are in parentheses. In 2000, 1 Guatemalan quetzal = US$0.128. —denotes not available.

* significant at the 0.05 level. ** significant at the 0.01 level.

An Econometric Model of Household Incomes with Selection Controls

It is possible to construct a counterfactual scenario without migration and remittances by treating households with no remittances as a random draw from the population, estimating a mean regression of incomes for these nonremittance households, and then using the resulting parameter estimates to predict the incomes of households with internal and international remittances. This approach becomes problematic, however, if households with and without remittances differ systematically in their incomes, because then the regression results will be biased. The purpose of this section is to examine the extent of selection bias, if any, using a multinomial logit-OLS two-stage selection control model.

To operationalize such a model, it is necessary to identify variables that are distinct for migration and the receipt of remittances in the first-stage equation, and for the determination of household income in the second-stage equation. The model is identifiable if there is at least one independent variable in the first-stage choice function that is not in the second-stage income function. Factors that affect migration and the receipt of remittances in the choice function, but do not affect household income in the income function, would then identify the model.

The first-stage choice function of the probability of a household that has a migrant and receives remittances can be estimated as follows.

$$\text{Prob}\,(Y = \text{migration and receive remittances}) = f[\text{Human Capital (Number of household members with preparatory, primary, secondary or university education), Household Characteristics (Age of household head, Household size, Number of males or females over age 15), Migration Network, Household Wealth (Value of house)}] \quad (2.1)$$

The rationale for including these variables in the choice equation follows the standard literature on migration and remittances. According to the basic human capital model, human capital variables are likely to affect migration, because better educated people enjoy greater employment and expected income-earning possibilities in destination areas (Todaro 1976; Schultz 1982).[10] In the literature, household characteristics—such as age of household head and number of male and female members—are also hypothesized to affect the probability of migration. In particular, some analysts (Lipton 1980; Adams, 1993) have suggested that migration is a life-cycle event in which households with older heads and more males and females over age 15 are more likely to participate. With respect to networks, the sociological literature has stressed the importance of family and village networks in encouraging migration (Massey 1987; Massey, Goldring, and

Durand 1994). Because nonindigenous people in Guatemala have a longer tradition of migration and stronger migration networks in destination communities (especially in the United States), equation 2.1 hypothesizes that households with a nonindigenous head will be more likely to produce migrants and receive remittances. Finally, because of the significant initial costs in financing migration, the economic literature often suggests that households with more wealth are likely to produce migrants (Barham and Boucher 1998; Lanzona 1998). The choice function in equation 2.1 therefore includes a wealth variable—value of house and value of house squared—with the expectation that middle-wealth households will have the highest probability of producing migrants and receiving remittances.

The second-stage income function can be estimated as follows.

$$\text{Household income} = g\,[\text{Human capital (Number of household members with secondary or university education), Household Characteristics (Age of household head, Household size, Number of males or females over age 15), Ethnic Variable}] \quad (2.2)$$

In equation 2.2, one of the household characteristic variables—age of household head—will identify the model. In other words, it is hypothesized that age of household head will affect household migration and the receipt of remittances, but that it will not have an impact on household income.[11] The reasoning for this is as follows. According to the literature, households with older heads are likely to produce more migrants because they have more household members in the "prime age span" for migration: ages 15 to 30. However, in equation 2.2 households with older heads are not expected to receive more income because, although income generally increases with level of education, older household heads in Guatemala tend to be less educated.

Estimating the Econometric Model with Selection Controls

Table 2.2 shows the regression coefficients and t-values from estimating the first-stage choice function. Several of the outcomes are unexpected. For internal remittances, there is a slight tendency for households with more educated members to have a higher propensity to receive internal remittances. However, for international remittances, no such tendency exists: the results suggest that households with the lowest level of education—preparatory education—actually have the highest propensity to receive remittances. Moreover, for internal and international remittances, the coefficients for the highest level of education—university education—are

TABLE 2.2 Multinomial Logit Model for Guatemala

Variable	Receive internal remittances (from Guatemala)	Receive international remittances (from the United States)
Human capital		
Number of members over age 15 with preparatory education	−0.216 (−0.83)	0.620 (3.70)**
Number of members over age 15 with primary education	0.057 (1.21)	0.169 (2.94)**
Number of members over age 15 with secondary education	0.174 (3.20)**	0.336 (5.34)**
Number of members over age 15 with university education	−0.009 (−0.11)	−0.051 (−0.46)
Household characteristics		
Age of household head	0.034 (12.84)**	0.292 (8.97)**
Household size	−0.043 (−2.07)*	0.037 (1.52)
Number of males over age 15	−0.442 (−6.83)**	−0.588 (−7.54)**
Number of females over age 15	0.143 (2.23)*	−0.048 (−0.65)
Networks		
Head of household is nonindigenous (1=Yes)	0.171 (2.06)*	0.194 (1.96)*
Wealth		
Value of house	0.001 (1.85)	0.001 (4.46)**
Value of house squared	−0.001 (−2.12)*	−0.001 (−4.05)**
Constant	−3.144 (−19.60)**	−3.792 (−19.76)**
Log likelihood	−4,560.71	
Restricted log likelihood	−4,831.25	
Chi−squared (22)	541.08	
Significance level	0.000	
N	7,276	

Source: Calculated from ENCOVI 2000.

Note: Figures in parentheses are t-values.

* significant at the 0.05 level, ** significant at the 0.01 level.

negative and statistically insignificant. In other words, the most educated households in Guatemala are not receiving more remittances because the relationship among education, migration, and remittances is not the strong, positive one hypothesized by human capital theory.

Table 2.3 presents results for the OLS and the sample selection-corrected household income estimates. Many of the coefficients have the expected sign. As hypothesized, the coefficient for age of household head is statistically insignificant in all cases, meaning that this variable has no effect on household income. Also as hypothesized, the coefficients for number of household members with secondary or university education are positive and usually highly significant.

The most important finding in table 2.3 is that the two selection control variables are statistically insignificant. The insignificant t-values on the selection control variables, and the fact that the other coefficient estimates in the table are generally similar in the two specifications, suggest that the subsample of nonmigrant households is randomly selected from the population. This means that, under the assumptions imposed, the bias resulting from estimating the equations by OLS without selection controls would be small.[12]

This finding of "no selection bias" is similar to the one reported by Barham and Boucher (1998) in their examination of selection bias among migrant households in Nicaragua. However, because this finding runs contrary to the common assumption in the literature that migrants are a "select" group (with respect to education, income, skill),[13] it is important to list some of the reasons for this no selection bias finding in Guatemala, two of which are provided below.

The first reason for the finding has already been broached, namely, that households receiving internal and international remittances in Guatemala are not positively selected with respect to education.[14] The results of the choice function model in table 2.2 show that households with the most educated members—university education—do not have the highest propensity to receive remittances. The second reason for the no-selection-bias finding relates to the nature of the data set. The Guatemala data are based on information collected from households in a labor-sending country, and thus they include data on households that are producing legal and illegal international migrants. It is likely that illegal international migrants come from poorer and less educated households than legal international migrants. As Taylor (1987) found for Mexico, many illegal migrants from Guatemala work in low-skill, low-income jobs in the United States, which are not attractive to members of wealthier and more educated households. For this reason, any study—like the present one—that includes information on legal and illegal migrants (and their remittances) is less likely to find selection bias than studies that are confined to legal migrants (and their remittances). In other words,

TABLE 2.3 Household Income Estimates (Selection Corrected) for Guatemala

Variable	Receive internal remittances[a]		Receive international remittances	
	OLS	Selection corrected	OLS	Selection corrected
Number of members over age 15 with secondary education	1,749.558 (6.64)**	1,641.541 (4.57)**	1,316.405 (2.78)**	939.245 (1.36)
Number of members over age 15 with university education	5,263.583 (12.57)**	6,220.215 (13.91)**	5,215.057 (5.78)**	6,933.377 (6.03)**
Age of household head	−30.548 (−1.07)	−68.026 (−1.04)	3.590 (0.13)	−8.081 (−0.16)
Household size	−933.157 (−7.01)**	−1,022.448 (−6.18)**	−985.309 (−4.11)**	−1,236.357 (−4.06)**
Number of males over age 15	631.744 (2.13)*	1,123.712 (1.39)	599.205 (1.02)	1,216.985 (1.25)
Number of females over age 15	55.971 (0.16)	543.890 (1.17)	−562.313 (0.88)	−980.547 (−1.18)
Head of household is nonindigenous (1=Yes)	2,658.155 (5.46)**	2,337.357 (3.85)**	1,985.362 (2.05)*	1,431.718 (1.05)
Lambda (Selection control)	—	−2,290.172 (−0.47)	—	−1,508.352 (−0.37)
Constant	7,762.936 (1.05)	12,650.837 (1.23)	8,755.980 (1.11)	13,996.067 (1.42)
Adjusted R^2	0.279	0.317	0.157	0.133
F−test	59.72	57.62	15.60	12.34
N	1,063	1,063	593	593

Source: Calculated from ENCOVI 2000.

Note: Dependent variable is annual per capita household income (excluding remittances). All values are weighted. Figures in parentheses are t-values. OLS = ordinary least squares.

a. From Guatemala

b. From the United States

* significant at the 0.05 level, ** significant at the 0.01 level.

including illegal international migrants in the data set reduces the likelihood that migrants are positively selected with respect to income, education, or skill.

Estimating Predicted Income Functions for the No-Migration/Remittance Counterfactual

This section discusses how counterfactual income estimates for households in the no-migration/remittance situation can be developed by using predicted income equations to identify the incomes of households with and without remittances. These counterfactual income estimates can be developed by using the following three-step procedure. First, the parameters predicting per capita household expenditure (excluding remittances) are estimated from the 5,665 households that do not receive remittances. The results of the preceding section showed that these parameters can be reliably estimated, without significant selection bias, from the 5,665 households not receiving remittances using OLS. Second, the parameters estimated from the 5,665 households with no remittances are applied to the 1,063 households that receive internal remittances (from Guatemala). Third, the parameters from the 5,665 households with no remittances are applied to the 593 households that receive international remittances (from the United States). This enables us to predict per capita household expenditures in the excluding remittances situation for the three groups of households: those receiving no remittances, those receiving internal remittances, and those receiving international remittances.

Given the data at hand, it can be hypothesized that per capita household expenditure (excluding remittances) in Guatemala can be predicted as the function of the following variables.

$$\begin{aligned} \mathrm{PREX}_i &= \alpha_0 + \alpha_1\,\mathrm{EDPREP}_i + \alpha_2\,\mathrm{EDPRIM}_i + \alpha_3\,\mathrm{EDSEC}_i + \alpha_4\,\mathrm{EDUNIV}_i \\ &+ \alpha_5\,\mathrm{SCHF}_i + \alpha_6\,\mathrm{SCHM}_i + \alpha_7\,\mathrm{HS}_i \\ &+ \alpha_8\,\mathrm{MALE15}_i + \alpha_9\,\mathrm{FEM15}_i + \alpha_{10}\mathrm{CHILD5}_i \\ &+ \alpha_{11}\mathrm{NON\_IND}_i + \alpha_{12}\,\mathrm{AR}_i + \sum_{j=1}^{7} \beta_{ij}\mathrm{REG}_{ij} + \varepsilon_i \end{aligned} \tag{2.3}$$

where for household i, PREX is per capita household expenditure (excluding remittances),[15] EDPREP is the number of household members over age 15 with preparatory education, EDPRIM is the number of household members over age 15 with primary education, EDSEC is the number of household members over age 15 with secondary education, EDUNIV is the number of household members

over age 15 with higher (university) education, SCHF is years of schooling of father, SCHM is years of schooling of mother, HS is household size, MALE15 is number of males in household over age 15, FEM15 is number of females in household over age 15, CHILD5 is number of children in household under age 5, NON_IND is head of household is nonindigenous (1 if yes, otherwise 0), AR is area of residence (one if urban, 2 if rural), and REG is seven regional dummy variables (with metropolitan region omitted).

It is important to discuss the reasons for including each of the regressors in equation 2.3. Following the logic of the previous section, four human capital and two parental education variables are included in the model. It is expected that each of these variables will be positive and significant. Four household characteristic variables also appear in the model. The household size variable captures the impact of family size on household expenditure and is expected to be negative. The other three household characteristic variables relate to the life-cycle factors discussed above: it is expected that the first two of these variables will have a positive impact on household expenditure and that the child variable will have a negative impact. Because ethnicity of the household is likely to affect household expenditures, an ethnic variable—1 if head of household is nonindigenous—is included in equation 2.3. Finally, in developing countries like Guatemala, average household expenditures are generally larger in urban than rural areas. For this reason, an area variable (1 if urban, 2 if rural) is included in the model; this variable is expected to have a negative sign.[16]

Table 2.4 reports the results obtained from using equation 2.3 to predict per capita household expenditure (excluding remittances). While many of the coefficients have the right sign and level of significance, several of the outcomes are unexpected. For example, with respect to human capital, the findings show that only the highest level of education—university education—has a positive and significant impact on household expenditure. This unexpected result suggests that returns to education in the local employment market are rather low (and possibly negative) for the lowest levels of education, such as primary education.[17] Similarly, although the level of schooling of the father has the expected positive and significant impact on household expenditure, the level of schooling of the mother does not. The latter outcome probably reflects both the low average level of schooling for the mother, as well as the rather limited job- and income-earning opportunities for older, uneducated women in Guatemala.

The parameter results from table 2.4 can be used to predict per capita household expenditure in the excluding remittances situation for the three groups of households: (a) those receiving no remittances, (b) those receiving internal remittances (from Guatemala), and (c) those receiving international remittances (from the United States).

TABLE 2.4 Regression to Estimate Predicted Per Capita Household Expenditure (Excluding Remittances)

Variable	Regression coefficient	t-ratio
Human capital		
Number of members over age 15 with preparatory education	−434.39	−1.04
Number of members over age 15 with primary education	−656.36	−5.57**
Number of members over age 15 with secondary education	−64.67	−0.41
Number of members over age 15 with university education	3,466.38	13.14**
Parents' education		
Father's years of schooling	610.53	18.59**
Mother's years of schooling	−89.80	−2.93**
Household characteristics		
Household size	−739.59	−13.06**
Number of males over age 15	303.56	1.93
Number of females over age 15	366.51	2.32*
Number of children under age 5	−781.66	−6.79**
Ethnicity		
Head of household is nonindigenous (1=Yes)	1,236.37	6.02**
Area		
Area (1 = urban, 2 = rural)	−1,429.23	−7.08**
Constant	14,566.37	29.43**
Adj. R^2 = 0.471		
F-statistic = 264.24		

Source: Calculated from ENCOVI 2000.

Note: Regression is based on those 5,665 households that receive no remittances. The parameters are used to predict per capita household expenditures (excluding remittances) for households that receive internal remittances (from Guatemala) or international remittances (from the United States). Seven regional dummy variables are included in the equation, but not reported in the table.

* significant at the 0.05 level, ** significant at the 0.01 level.

Once counterfactual household expenditures have been predicted for the three groups of households in the excluding remittances situation, household expenditures in the including remittances situation can be calculated as follows. First, for those households receiving internal or international remittances, the predicted income contribution of the migrant as estimated from equation 2.3 can be set to 0. Second, the actual amounts of internal or international remittances received by

households from migrants can be added to the level of household expenditures. For households receiving remittances, these internal and international remittances average 1,431.4 and 2,259.2 quetzals per capita per year, respectively.

Table 2.5 summarizes our efforts to predict per capita household expenditure for the three groups of households in the two situations: (a) excluding remittances and (b) including remittances. Three key findings emerge from this table. First, when predicted equations are used to impute the home (domestic) earnings of migrants, households receiving remittances are richer than households not receiving remittances. Because migration, especially international migration, can be a costly endeavor, it is perhaps logical that migration represents a more viable option for households with more income (expenditure). However, the second finding from table 2.5 tends to bring a cautionary note to the preceding finding. Although migration may have its costs, it is rather paradoxical to note that, in the excluding remittances situation, households receiving internal remittances have higher mean incomes (expenditures) than do households receiving international remittances. Because internal migration should generally be less expensive than international migration, this outcome is unexpected. Perhaps the best explanation for this paradoxical outcome is that, while migration may have its costs, the economic costs of migration are not the only factor "explaining" the willingness of people to work in another place. The final finding in table 2.5 is quite expected, namely that remittances greatly increase the level of household expenditure. In the including remittances situation, the average level of expenditures for households receiving internal and international remittances is 37.1 and 39.5 percent higher, respectively, than that for households not receiving remittances.

Remittances and Poverty

Now that per capita household expenditures have been predicted in the two situations—excluding and including remittances—for the three groups of households, it is possible to examine the impact of these financial transfers on poverty in Guatemala. This is done in table 2.6.

Table 2.6 is based on the World Bank poverty line for Guatemala in 2000 of 4,319 quetzels per person per year.[18] Table 2.6 reports three different poverty measures using this poverty line. The first measure—poverty headcount—shows the percent of the population living beneath the poverty line. The second measure—poverty gap—focuses on the depth of poverty by showing in percentage terms how far the average expenditures of the poor fall short of the poverty line. The third poverty measure—squared poverty gap—indicates the severity of poverty. The squared poverty gap index possesses useful analytical properties, because it is sensitive to changes in distribution among the poor.

TABLE 2.5 Predicted Per Capita Expenditures for Nonremittance Households and Remittance-Receiving Households, Guatemala, 2000

	Receive no remittances	Receive internal remittances (from Guatemala)	Receive international remittances (from the United States)	Percent change (no remittances versus internal remittances)	Percent change (no remittances versus international remittances)
			(in quetzals)		
Predicted mean annual per capita expenditures (excluding remittances)	7,399.26	8,710.49	8,062.03	+17.72	+8.95
Predicted mean annual per capita expenditures (including remittances)	7,399.26	10,141.88	10,321.26	+37.06	+39.49
N	5,665	1,063	593		

Source: Calculated from ENCOVI 2000.

Note: N = 7,276 households; 88 households receive both internal remittances (from Guatemala) and international remittances (from the United States). All values are predicted from equation 2.3; see text. All values are weighted. In 2000, 1 Guatemalan quetzal = US$0.128.

Columns (1)–(4) of table 2.6 report the results for the different poverty measures when remittances are excluded or included in predicted household expenditure. With only one exception, the various poverty measures show that the inclusion of remittances—either internal or international—in household expenditure reduces the level, depth, and severity of poverty in Guatemala. However, the size of the poverty reduction greatly depends on how poverty is measured. According to the poverty headcount measure, including internal remittances in household expenditure reduces the level of poverty by only 1 percent and including international remittances in such expenditure actually increases the level of poverty by 1.6 percent. However, poverty is reduced much more when measured by indicators focusing on the depth and severity of poverty, such as the poverty gap and squared poverty gap. For example, the squared poverty gap measure shows that including internal or international remittances in household expenditure reduces poverty by 23.5 or 21.9 percent, respectively. In other words, including remittances—internal or international—in household expenditure has a greater impact on reducing the severity of poverty in Guatemala than it does on reducing the proportion of people living in poverty.

Columns (1) to (4) of table 2.6 reveal that the inclusion of internal or international remittances in household expenditure has little impact on income inequality, as measured by the Gini coefficient.[19] With the receipt of either internal or international remittances, inequality remains relatively stable with a Gini coefficient of about 0.50. This means that most of the poverty-reducing effect of remittances in Guatemala comes from increases in mean household income (expenditure) rather than from any progressive change in income inequality caused by these income flows.

Remittances and Investment: Selecting a Functional Form for Analysis

This section examines how internal and international remittances are spent or used in Guatemala. To do this, it is necessary to compare the marginal spending behavior for the three groups of households on six different categories of expenditure: food,[20] consumer goods/durables, housing, education, health, and other. The goal is to see whether households receiving internal or international remittances spend their income differently from those households that do not receive remittances.

It is necessary to choose a proper functional form to analyze the marginal spending behavior of these different groups of households. The selected functional form must do several things. First, it should provide a good statistical fit to household expenditure on a wide range of goods. Second, because of the focus on expenditure-consumption relationships, the chosen form must have a slope that

TABLE 2.6 Effect of Remittances on Poverty for Nonremittance-Receiving and Remittance-Receiving Households, Guatemala, 2000

	Receive no remittances (1)	Receive internal remittances (from Guatemala) (2)	Receive international remittances (from the United States) (3)	Receive internal and international remittances (4)	% change (no remittances versus internal remittances) (5)	% change (no remittances versus international remittances) (6)	% change (no remittances vs. internal and international remittances (7)
Poverty headcount (percent)	55.28	54.74	56.19	54.17	(−0.98)	+1.65	(−2.01)
Poverty gap (percent)	25.89	23.63	22.62	24.95	(−8.73)	(−12.64)	(−3.64)
Squared poverty gap (percent)	18.82	14.40	14.69	17.43	(−23.49)	(−21.95)	(−7.39)
Gini coefficient	0.505	0.490	0.486	0.504	(−2.98)	(−3.77)	(−0.20)
Predicted mean per capita household expenditure[a]	7,625.85	7,921.35	7,721.43	7,984.55	+3.87	+1.25	+4.70
N	7,276	7,276	7,276	7,276			

Source: Calculated from ENCOVI 2000.

Note: Column 1 uses predicted income equations to measure the situation excluding remittances for all 7,276 households. Column 2 measures the situation for all households when only internal remittances (from Guatemala) are included in predicted household expenditure. Column 3 measures the situation for all households when only international remittances (from the United States) are included in predicted household expenditure. Column 4 measures the situation for all households when both internal and international remittances are included in predicted household expenditure. Poverty calculations made using 2000 World Bank poverty line of 4,319 quetzals/ person/ year. For predicted income equation, see text. All values are weighted. In 2000, 1 Guatemalan quetzal = US$0.128.

a. Includes remittances in quetzals.

is free to change with expenditure. What is needed is a functional form that mathematically allows for rising, falling, or constant marginal propensities to spend over a broad range of goods and expenditure levels. Third, the chosen form should conform to the criterion of additivity. To be internally consistent, the sum of the marginal propensities for all goods should equal unity.

One functional form that meets all of these criteria is the Working-Leser model, which relates budget shares linearly to the logarithm of total expenditure. A modified version of the Working-Leser model represents the basic form that will be used in this analysis.[21] In expenditure share form, this model can be written as follows.

$$C_i/\text{EXP} = \beta_i + a_i/\text{EXP} + \gamma_i (\log \text{EXP}) \tag{2.4}$$

where C_i/EXP is the share of expenditure on good i in total expenditure EXP. Adding up requires that $\Sigma\, C_i/\text{EXP} = 1$.

In comparing the expenditure behavior of households with different levels of income, various socioeconomic and locational factors other than expenditure must be taken into account. Part of the observed differences in expenditure behavior, for example, may be caused by differences in household composition (family size, number of children, and so on), education, urban or rural residence, geographic region, or (in this sample) receipt of internal or international remittances. These household characteristic variables need to be included in the Engel functions in a way that allows them to shift both the intercept and the slope of the Engel functions. Let Z_j denote the household characteristic variable j and let μ_{ij} and λ_{ij} be constants. The complete model in semi-log ratio form is then as follows.

$$C_i/\text{EXP} = \beta_i + a_i/\text{EXP} + \gamma_i\, (\log \text{EXP}) + \Sigma_j[(\mu_{ij})Z_j/\text{EXP} + \lambda_{ij}(Z_j)] \tag{2.5}$$

To estimate equation 2.5, the various household characteristic variables need to be specified and identified. Therefore, in addition to the variables that have already been defined in equation 2.3, AGEHD is the variable for age of household head. The complete model to be estimated is then as follows.

$$\begin{aligned} C_i/\text{EXP} &= \beta_1 + \alpha_i/\text{EXP} + \gamma_1(\log \text{EXP}) + \gamma_2\text{INTREM} + \gamma_3(\text{INTREM})(\log \text{EXP}) \\ &+ \gamma_4\text{EXTREM} + \gamma_5(\text{EXTREM})(\log \text{EXP}) + \mu_1\text{HS/EXP} + \lambda_1\text{HS} \\ &+ \mu_2\text{AGEHD/EXP} + \lambda_2\text{AGEHD} + \mu_3\text{CHILD5/EXP} \\ &+ \lambda_3\text{CHILD5} + \mu_4\text{EDPREP/EXP} + \lambda_4\text{EDPREP} + \mu_5\text{EDPRIM/EXP} \\ &+ \lambda_5\text{EDPRIM} + \mu_6\text{EDSEC/EXP} + \lambda_6\text{EDSEC} + \mu_7\text{EDUNIV/EXP} \\ &+ \lambda_7\text{EDUNIV} + \delta_1\text{AR} + \delta_2 \sum_{j=1}^{7} \lambda_j\, \text{REG}_j + \varepsilon_i \end{aligned} \tag{2.6}$$

where:

C_i = annual per capita household expenditure on one of six expenditure categories defined above (food, consumer goods/durables, housing, education, health, or other)
EXP = total annual per capita household expenditure
INTREM = internal remittances dummy variable (1 if household receives internal remittances, 0 otherwise)
EXTREM = international remittances dummy variable (1 if household receives international remittances, 0 otherwise)

In equation 2.6 the dummy variables for the receipt of internal and international remittances (INTREM and EXTREM) are entered separately and linearly, and each of these dummy variables is also interacted with the log of total annual expenditures (log EXP) to affect both the intercept and the slope of the Engel functions. This means that the marginal budget share for good *i* can be derived using the equations in Adams (2005a, 11).

Empirical Results: Remittances and Household Expenditure Behavior

Equation 2.6 was estimated on all 7,276 survey households and results are shown in tables 2.7 and 2.8. Table 2.7 shows the results without remittance variables, and table 2.8 shows the results with both remittance variables.

In table 2.8, when the relevant coefficients (log EXP and INTREM*log EXP) are summed up, the results show that households receiving internal remittances spend less on food, and more on consumer goods/durables, housing, health, and other. These latter findings are encouraging because, although food represents a consumption good (except in cases of malnutrition), health is more like an investment item. The results for international remittances are identical to those for internal remittances.

The results of equation 2.6 can be used to calculate marginal budget shares for the three groups of households on the six different categories of expenditure. This makes it possible to identify at the margin how the receipt of internal or international remittances affects the expenditure patterns of households in Guatemala.

Table 2.9 presents the marginal budget shares for the households on the various categories of expenditure. Three results are noteworthy. First, households receiving remittances spend less at the margin on food than non-remittance-receiving households. At the margin, households receiving internal and international remittances spend 11.9 and 14.8 percent less, respectively, on food than do

TABLE 2.7 OLS Regression Analysis of Household Expenditure in Guatemala, without Remittance Variables

Variable	Food	Consumer goods, durables	Housing	Education	Health	Other
Reciprocal of total per capita expenditure (α_i/EXP)	− 371.096 (−9.81)**	1.243 (−0.05)	149.316 (5.75)**	−25.314 (−1.67)	47.858 (3.89)**	200.479 (8.05)**
Log total annual per capita household expenditure (log EXP)	−0.115 (−20.24)**	0.048 (12.68)**	0.011 (2.92)**	−0.001 (−0.08)	0.015 (8.59)**	0.039 (10.52)**
Household size (HS)	0.001 (0.07)	0.007 (7.19)**	−0.015 (−14.86)**	0.011 (19.79)**	−0.001 (−2.14)**	−0.003 (−2.97)**
Household size/total expenditure	16.284 (4.37)**	−3.864 (−1.54)	10.546 (4.12)**	−14.709 (−9.82)**	0.036 (0.03)	−8.293 (−3.38)**
Age of household head (AGEHD)	−0.001 (−1.21)	−0.001 (−13.39)**	0.002 (15.58)**	−0.001 (−7.86)*	0.001 (3.50)**	0.001 (2.35)*
Age household head/total expenditure	0.577 (1.14)	2.054 (6.03)**	−3.036 (−8.74)**	0.621 (3.06)**	−0.046 (−0.28)	−0.171 (−0.51)
Number of children in household less than 5 years (CHILD5)	−0.001 (−0.10)	0.005 (2.26)*	0.010 (4.41)**	−0.029 (−21.81)**	0.009 (8.01)**	0.006 (2.59)**
Number children/total expenditure	1.227 (0.13)	−11.980 (−1.94)	−12.103 (−1.92)	45.895 (12.46)**	−14.000 (−4.70)**	−9.033 (−1.50)
Number household members with preparatory education (EDPREP)	−0.017 (−1.33)	0.011 (1.35)	0.001 (0.02)	−0.003 (−0.67)	0.006 (1.40)	0.002 (0.33)
Number preparatory education/total expenditure	24.187 (0.68)	−33.506 (−1.40)	23.405 (0.96)	23.405 (−0.01)	−9.805 (−0.85)	−4.178 (−0.18)
Number household members with primary education (EDPRIM)	−0.006 (−2.47)*	0.008 (4.80)**	−0.001 (−0.42)	−0.005 (−5.24)**	0.002 (2.55)*	0.002 (1.21)

Number primary education/total expenditure	−7.521 (−1.14)	−11.422 (−2.56)*	9.216 (2.03)*	7.809 (2.94)**	0.566 (−0.26)	2.483 (0.57)
Number household members with secondary education (EDSEC)	−0.024 (−8.13)**	0.008 (3.82)**	0.001 (0.16)	0.011 (9.40)**	0.004 (3.99)**	0.001 (0.56)
Number secondary education/total expenditure	−46.460 (−3.25)**	−15.262 (−1.59)	18.477 (1.88)	35.409 (6.17)**	−3.672 (−0.79)	11.507 (1.22)
Number household members with university education (EDUNIV)	−0.035 (−6.74)**	0.007 (2.02)*	−0.001 (−0.41)	0.017 (8.36)**	0.006 (3.65)**	0.006 (1.69)
Number university education/total expenditure	−33.853 (−0.77)	−39.506 (−1.33)	−52.189 (1.73)	−7.388 (−0.42)	0.109 (0.01)	28.448 (0.98)
Constant	1.474 (25.48)**	−0.262 (−6.72)**	0.079 (1.99)*	0.039 (0.90)	−0.128 (−6.82)**	−0.202 (−5.32)**
Adj. R^2	0.411	0.154	0.200	0.328	0.087	0.080
F-statistic	212.5	56.4	76.8	149.3	31.6	27.4

Source: Calculated from ENCOVI 2000.

Note: N = 7,276 households. Numbers in parentheses are t-statistics (two-tailed). One area dummy variable and seven regional variables are included in the equation, but are not reported in the table. All expenditure categories defined in table 2.2. OLS = ordinary least squares.

*significant at the 0.05 level, **significant at the 0.01 level.

TABLE 2.8 OLS Regression Analysis of Household Expenditure in Guatemala, with Remittance Variables

Variable	Food	Consumer goods, durables	Housing	Education	Health	Other
Reciprocal of total per capita expenditure (α_i/EXP)	−375.350 (−9.87)**	−1.961 (−0.08)	146.228 (5.60)**	−27.216 (−1.78)	47.748 (3.86)**	206.628 (8.25)**
Log total annual per capita household expenditure (log EXP)	−0.115 (−19.93)**	0.049 (12.54)**	0.011 (2.66)**	−0.001 (−0.41)	0.016 (8.45)**	0.041 (10.73)**
Internal remittances dummy (INTREM)	0.004 (0.11)	0.058 (2.04)*	−0.080 (−2.74)**	−0.008 (−0.48)	−0.012 (−0.93)	0.038 (1.35)
(Internal remittances dummy) x (Total household expenditure) (INTREM)(log EXP)	−0.001 (−0.32)	−0.007 (−2.17)*	0.010 (3.13)**	0.001 (0.78)	0.001 (1.04)	−0.004 (−1.54)*
International remittances dummy (EXTREM)	−0.131 (−2.17)*	0.007 (0.18)	0.051 (1.24)	−0.013 (−0.53)	0.008 (0.42)	0.077 (1.94)
(International remittances dummy) x (Total household expenditure) (EXTREM)(log EXP)	0.012 (1.88)	0.001 (0.09)	−0.005 (−1.20)	0.002 (0.89)	−0.001 (−0.59)	−0.008 (−1.96)*
Household size (HS)	0.001 (0.23)	0.006 (6.91)**	−0.014 (−14.74)**	0.011 (19.61)**	−0.001 (−1.96)*	−0.002 (−3.05)**
Household size/total expenditure	16.114 (4.32)**	−3.482 (−1.39)	10.264 (4.01)**	−14.588 (−9.74)**	−0.082 (−0.07)	−0.082 (−3.35)**
Age of household head (AGEHD)	−0.001 (−0.71)	−0.001 (−13.05)**	−0.001 (14.62)**	0.001 (−8.49)**	0.001 (3.35)**	0.001 (2.72)**
Age household head/total expenditure	0.524 (1.03)	1.985 (5.80)**	−2.895 (−8.30)**	0.673 (3.31)**	−0.032 (−0.19)	−0.256 (−0.77)

Number of children in household less than 5 years (CHILD5)	−0.001 (−0.17)	0.005 (2.38)*	0.010 (4.35)**	−0.029 (−21.79)**	0.008 (7.93)**	0.006 (2.65)**
Number children/total expenditure	2.285 (0.25)	−12.703 (−2.06)*	−12.005 (−1.91)	45.550 (12.38)**	−13.817 (−4.63)**	−9.309 (−1.54)
Number household members with preparatory education (EDPREP)	−0.016 (−1.30)	0.011 (1.29)	0.001 (0.04)	−0.003 (−0.71)	0.006 (1.45)	0.002 (0.33)
Number preparatory education/total expenditure	23.597 (0.67)	−32.767 (−1.37)	23.207 (0.95)	0.294 (0.02)	−10.119 (−0.88)	−4.212 (−0.18)
Number household members with primary education (EDPRIM)	−0.006 (−2.53)*	0.008 (4.83)**	−0.001 (−0.39)	−0.005 (−5.18)**	0.002 (2.54)*	0.002 (1.20)
Number primary education/total expenditure	−7.732 (−1.17)	−11.342 (−2.55)*	9.265 (2.04)*	7.864 (2.97)**	−0.582 (−0.27)	2.528 (0.58)
Number household members with secondary education (EDSEC)	−0.024 (−8.10)**	0.007 (3.88)**	0.001 (0.02)	0.011 (9.26)**	0.003 (3.97)**	0.001 (0.70)
Number secondary education/total expenditure	−46.957 (−3.29)**	−15.612 (−1.62)	19.540 (1.99)*	36.102 (6.30)**	−3.625 (−0.78)	10.552 (1.12)
Number household members with university education (EDUNIV)	−0.035 (−6.82)**	0.007 (2.21)*	−0.001 (−0.49)	0.018 (8.58)**	0.006 (3.50)**	0.005 (1.64)
Number university education/total expenditure	−34.324 (−0.78)	−41.397 (−1.40)	53.874 (1.78)	−8.666 (−0.49)	0.865 (0.06)	29.648 (1.02)
Constant	1.481 (25.13)**	−0.266 (−6.71)**	0.086 (2.14)*	0.046 (1.97)*	−0.129 (−6.74)**	−0.218 (−5.63)**
Adj. R^2	0.412	0.155	0.202	0.331	0.092	0.080
F-statistic	183.3	48.9	67.0	129.4	27.3	23.8

Source: Calculated from ENCOVI 2000.

Note: N=7,276 households. Numbers in parentheses are t-statistics (two-tailed). One area dummy variable and seven regional variables are included in the equation, but are not reported in the table. All expenditure categories defined in table 2.2.

*significant at the 0.05 level, **significant at the 0.01 level.

TABLE 2.9 Marginal Budget Shares on Expenditure for Nonremittance Households and Remittance-Receiving Households, Guatemala, 2000

Expenditure category	Households receiving no remittances (N=5665)	Households receiving internal remittances from Guatemala) (N=1063)	Households receiving international remittances (from the (from the (N=593)	% change (no remittances versus internal remittances) internal remittances)	% change (no remittances versus international remittances)
Food	0.386	0.340	0.330	(−11.92)	(− 14.77)
Consumer goods, durables	0.203	0.202	0.229	(−0.50)	+ 12.81
Housing	0.183	0.211	0.187	+15.30	+ 2.18
Education	0.031	0.045	0.04	+45.16	+58.06
Health	0.023	0.028	0.023	+21.74	—
Other	0.173	0.188	0.177	+ 8.67	+ 2.31

Source: Calculated from ENCOVI 2000.

Note: Some figures do not sum to unity because of rounding. All expenditure categories defined in Adams (2005a, table 2.2).

non-remittance-receiving households. There is no evidence here that remittance-receiving households "waste" their increased earnings on "conspicuous" food consumption. Second, households receiving remittances spend more of their increments to expenditure on housing than do non-remittance-receiving households. The percentage increases for marginal spending on housing are 15.3 percent for households receiving internal remittances and 2.2 percent for households receiving international remittances (with the difference statistically significant). Like other studies, this suggests that remittance-receiving households are devoting much of their increments to expenditure on housing, an investment from the standpoint of the individual migrant who provides an expected stream of utility or of financial return. Third, while the absolute levels of expenditure are quite small, remittance-receiving households are spending considerably more at the margin on education. The percentage increases for marginal spending on education, which are the largest in the table, are 45.2 percent for households receiving internal remittances and 58.1 percent for households receiving international remittances. As discussed in Adams (2005a, 18), when these marginal expenditures on education are disaggregated by level of education, most of these incremental expenditures on education go to higher education. For example, at the secondary level, households receiving internal and international remittances spend 19.6 and 142.4 percent more, respectively, on secondary education than do non-remittance-receiving households. These large marginal increases in spending on higher education are important because increased expenditure on education can raise the level of human capital in the country as a whole. Because the level of human capital is an important component of economic growth, increased expenditure on education by remittance-receiving households may provide the means for raising the rate of economic growth in a country.

Conclusion

Three key findings emerge from this analysis of the impact of internal and international remittances on poverty and investment in Guatemala.

First, using predicted equations to develop counterfactual income estimates for households with and without remittances, the chapter finds that both internal and international remittances reduce the level, depth, and severity of poverty in Guatemala. However, the size of the poverty reduction greatly depends on how poverty is measured. According to the poverty headcount measure, the inclusion of internal remittances in household expenditure reduces the level of poverty by only 1 percent and the inclusion of international remittances in such expenditure actually increases the level of poverty by 1.6 percent. However, poverty is reduced

much more when measured by indicators focusing on the depth and severity of poverty. For example, the squared poverty gap (which measures the severity of poverty) shows that including internal or international remittances in household expenditure reduces poverty by 23.5 or 21.9 percent, respectively.

Second, contrary to other studies, this analysis finds that the majority of remittance earnings are not spent on consumption goods. In fact, at the mean level of expenditure, this study finds that although households without remittances spend 58.9 percent of their increments to expenditure on consumption goods—food and consumer goods, durables— households receiving internal and international remittances spend 54.2 and 55.9 percent, respectively, on consumption goods. In other words, at the margin, households receiving remittances actually spend less (not more) on consumption than do households without remittances.

Third, instead of spending more on consumption, households receiving remittances tend to view their remittance earnings as a temporary (and possibly uncertain) stream of income, one to be spent more on investment than consumption goods. For example, at the margin, households receiving internal and international remittances spend 45.2 and 58.1 percent more, respectively, on education than households that do not receive remittances. This increased marginal spending on education underscores the way that households prefer to invest—rather than spend—their remittance earnings.

Endnotes

1. While no estimates are available regarding the size of internal remittances, Ratha (2004) has recently estimated that official international remittances to the developing world now total $93 billion per year, making them the second most important source of external funding in developing countries.
2. See, for example, Chami, Fullenkamp, and Jahjah (2003).
3. This paper represents a shortened and condensed version of Adams (2005a, 2005b).
4. Several researchers have examined remittances as an exogenous transfer of resources on income inequality in developing countries. See, for example, Stark, Taylor, and Yitzhaki (1986).
5. For other attempts to treat remittances as a substitute for home earnings and to predict (estimate) the incomes of households with and without migration, see Barham and Boucher (1998) and Adams (1991).
6. This 2000 Guatemala household survey was implemented as part of the "Program for the Improvement of Surveys and Measurement of Living Conditions in Latin America and the Caribbean" (ENCOVI), which was sponsored by the Inter-American Development Bank (IDB), the World Bank and the Economic Committee for Latin America and the Caribbean (CEPAL).
7. For more details on this 2000 Guatemala household survey, see World Bank (2003).
8. Following are the five possible responses to the question "where do these people sending (your household) remittances live?" (a) Guatemala; (b) United States; (c) Mexico; (d) Central America; and (e) other countries.
9. A smaller number of survey households (43) received remittances from other countries, and are not counted as remittance-receiving households in this study.
10. While early work on the human capital model found that education had a positive impact on migration (Todaro 1976; Shultz 1982;), more recent empirical work in the Arab Republic of Egypt

(Adams 1991, 1993) and Mexico (Taylor 1987; Mora and Taylor 2005) has found that migrants are not necessarily positively selected with respect to education.

11. Other work has found that, although age of household head will affect household migration, this variable will have no impact on premigration household income. See, for example, Adams (2005c) in Ghana.

12. This finding is robust to alternative ways of specifying the choice and income functions in equations (1) and (2). For more information, contact the author.

13. See, for example, Chiswick (2000) and Carrington and Detragiache (1998).

14. In a recent study of the determinants of international migration from rural Mexico, Mora and Taylor (2005) also find that international migrants to the United States are not positively selected on the basis of education.

15. In equation (2.3), the dependent variable is per capita household expenditure (excluding remittances), rather than per capita household income (excluding remittances). There are three reasons for using expenditure rather than income data here. First, because people tend to use savings to smooth fluctuations in income, many economists believe that expenditures provide a more accurate measure of an individual's welfare over time. Second, in developing countries, like Guatemala, expenditures are often easier to measure than income because of the many problems involved in measuring income for the self-employed in agriculture. Third, the poverty line used in this paper is based on expenditure rather than income data. To be consistent, it is therefore preferable to work with expenditure data in the predicting equation.

16. Seven regional dummy variables (referenced to the capital city) are also included in equation (2.3).

17. In fact, a recent World Bank study (2003, table 7.3) found that returns to primary school education are relatively low in Guatemala. When compared with people with no education, people who had completed primary education received 15 percent more in hourly wages, while those who had completed university education received 74 percent more.

18. This poverty line is defined as the level of per capita expenditures needed to meet the costs of attaining minimum food requirements of 2,172 kilocalories per person per day. The costs of meeting minimum nonfood expenditures are also added to this food line. The result is a national poverty line—including food and nonfood costs—for Guatemala in 2000. For more details on this poverty line, see World Bank (2003, annex 3).

19. These results are different from those reported by Adams (1995) for rural Pakistan, where internal remittances were found to reduce income inequality, and international remittances represented an inequality-increasing source of income.

20. Food expenditures include the value of both purchased and own-produced (and consumed) food. See World Bank (2003, 229–30).

21. The functional form used in this analysis differs from the Working-Leser model because it includes an intercept. In theory, C_i should always equal zero whenever total expenditure EXP is zero, and this restriction should be built into the function. But zero observations on EXP invariably lie well outside the sample range. Also, observing this restriction with the Working-Leser model can lead to poorer statistical fits. Including the intercept term in the model has little effect on the estimation of marginal budget shares for the average person, but it can make a significant difference for income distribution results.

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