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Abstract:

Remittances are a very important source of income for many Nicaraguan families. More than 40% of all households receive remittances that on average amount to 12-15% of total household income in these households. More than 30% of these households receive remittances at least monthly, implying that it is a relatively stable source of income.

This paper shows that remittances do tend to reduce the vulnerability of households and increase their upward social mobility, at least as long as the households do not depend too heavily on remittances.

However, remittances also cause moral hazard problems. Nicaraguans tend to reduce their labor supply in response to more remittances, and they also tend to reduce their savings rates, both of which are detrimental to long run economic growth.

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JEL classification: F35.

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1. Introduction

After half a century of development aid and development research, it has proved very difficult to show a positive and statistically robust effect of aid on development in recipient countries (e.g. Ovaska, 2003; Hansen & Tarp, 2001; Doucouliagos & Paldam, 2005). There are several convincing and complementary explanations for the disappointing performance. General equilibrium theory predicts that foreign aid causes "Dutch Disease," which tends to hurt local export sectors through an overvalued exchange rate. Economic theory also predicts that aid projects and aid bureaucracy attract scarce local resources, mainly skilled labor and capital, away from local productive sectors, thus diminishing local productive capacity.

The latter effect is supported by Easterly's (2002) review of the bureaucratic requirements poor countries are subjected to in order to receive aid. Given the additional bureaucracy on the donor side, it makes little sense to measure aid by inputs (money spent on aid), as is usually done. Easterly argues that development projects are inherently high risk investments, and donors have set up cooperative systems to disguise failures and make it difficult to assign blame and evaluate project impacts. This system dramatically reduces the possibility of improving the effectiveness of aid.

Easterly (2002) proposes to introduce market forces into the provision of foreign aid through aid vouchers given directly to poor people. The poor can then shop around and acquire the services that they desire most from the most efficient providers.

Whether aid vouchers directly to poor people will work better than aid to governments depends a lot on how individuals change their behavior in response to these vouchers. Will they use the extra funds for productive investments? Will their children study more? Or will they use the aid to buy more leisure? Or gamble more?

A lot can be learned on these questions by studying the impact of remittances, which lately has turned into a very important source of cash transfers to needy households. By 2001,

remittance inflows to developing countries were more than twice as large as official development inflows (Ratha, 2003).

The impacts of remittances are still poorly understood, however. An important World Bank study finds that, in a cross-section of 74 low and middle-income developing countries, *remittances have a strong statistical impact on reducing poverty* (Adams & Page, 2003). However, an impressive IMF study (Chami, Fullenkamp & Jahjah, 2003) finds, using a panel of 113 developing countries, that remittances are negatively correlated with economic growth, both within and between countries. This may be because remittances are used as an insurance mechanism (i.e. transfers are increased when the economy is doing relatively poorly), but the authors also find evidence of a causal effect implying that *remittances are detrimental for economic growth*. The latter effect is attributed to moral hazard problems, i.e., the possibility of receiving remittances may lead to a reduction in effort on the part of the recipient.

It is quite possible that both the World Bank and IMF studies are right, that remittances provide short-run relief but tend to be detrimental for long run development, especially if the funds are used not to jump-start local engines of development, but rather as a cheap supply of on-going fuel. It is therefore important to analyze not only the static but also the dynamic effects of remittances. The cross-country level of analysis in the two previously mentioned studies does not permit a more thorough analysis of the mechanisms behind neither the positive nor the negative effects of remittances. Such details have to be inferred from individual or household level data sets which include information about remittances received, labor force participation, hours worked, school attendance, poverty status, etc.

In this paper, we investigate the micro-level effects of remittances using longitudinal household survey data from Nicaragua. The paper investigates both the overall effect of remittances on future social mobility as well as the underlying causal effects related to changes in school attendance, hours worked, savings, and consumption patterns.

The rest of the paper is laid out as follows. In section 2, we present the data used in this study and demonstrate the importance of remittances in Nicaragua. In section 3, we introduce our methodology for the dynamic analysis of social mobility and apply this to the Nicaraguan panel data. We establish the existence of positive returns to remittances, but only up to a certain level. In section 4, we extend the analysis of the impact of remittances to household decisions, in particular schooling, labor supply, consumption and investment. Section 5 concludes.

2. The Importance of Remittances in Nicaragua

Nicaragua is well suited for the study of remittances, both because it is a poor country where remittances account for an important share of household incomes[1], but also because of the availability of panel data. The two living standard measurement surveys conducted in Nicaragua in 1998 and 2001 have the unusual, but very useful, feature that, to the extent possible, the same families have been surveyed in both years. This proves to be a tremendous advantage when investigating the dynamic effects of remittances.

More than 17,500 individuals were interviewed both in the 1998 and in the 2001 survey, but some observations had to be eliminated due to obvious inconsistencies, such as sex changes or rejuvenation. Our final sample contains 13,359 individuals in 2,572 households with complete data for our purposes. The data are comprehensive, providing individual level observations on age, gender, education, work, etc. and household level information on family composition, consumption, investment, and poverty status in both 1998 and 2001. As a proxy for remittances, we use the variable "Amount of money received from friends and family members." Here, friends and family members are outside the household, but not necessarily outside the country. The variable is available at the individual level, but we have aggregated it to the household level and calculated an average amount of remittances received per household member, under the assumption that the transfers are shared within the family.

[1] Remittances into Nicaragua have accounted for at least 7% of GDP since 1997, peaking at 13.6% in 1999 due to Hurricane Mitch (World Development Indicators, The World Bank).

According to official national data, worker remittances accounted for 10% of GDP in 1998, or about $42 per person[2]. Since this amount includes only transfers through official channels, and not presents carried in personally, it underestimates true remittances. However, the numbers correspond quite well with the information in the 1998 household survey, which indicates that gifts received (both from abroad and from within the country) account for 11% of total household income, or about $39 per person. The close correspondence between the two different sources indicates that our proxy for remittances is of the right order of magnitude, at least at the aggregate level.

A technical problem arises with respect to the variable measuring remittances in 1998, as people were asked only about gifts received during the last month. If we simply multiply this variable by 12 in order to get annual figures, we get an unrealistic picture of how many people received remittances and how much they received. Essentially, we get too few people receiving too large amounts of remittances.

This problem was solved in the 2001 survey, since people then were asked how much and how frequently they received transfers during the last 12 months, and whether they were from national or external sources. This made the distribution across the population much more accurate, but introduced a new problem with recall. People apparently forgot about remittances received several months back, as the total amount of remittances suggested by the survey, $24/person, falls far short of the average suggested by the official national data for 2001, $64/person[3].

Table 2 presents summary information about the importance of remittances in 1998, according to the household survey. In 1998, the data showed that about 22% of all households received remittances in the month before the survey, and that it is more common for non-poor households to receive remittances. The average amount of remittances received is considerably larger for non-poor households than for poor or

[2] World Development Indicators, The World Bank.
[3] World Development Indicators, The World Bank.

extremely poor households, but when measured as share of total income, it is about the same for all groups. Remittances received, for the households that did receive remittances, were extremely important, amounting to about a third of total household income for poor and non-poor households alike, in the month before the survey.

Table 2: The importance of remittances in Nicaragua 1998

Indicators 1998	Household types			
	Extremely Poor	**Moderately Poor**	**Non-Poor**	**Total**
Households that receive remittances (% of all households)	14.8%	17.9%	26.1%	21.9%
Average amount of remittances received (US$/year/person)	6.57	14.61	62.22	34.71
Remittances received (as % of total household income)	10.4%	9.7%	10.1%	10.0%
Average amount of remittances received (US$/year/person) (Only Households that receive remittances)	46.65	80.82	243.83	168.26
Remittances received (as % of total household income) (Only Households that receive remittances)	33.9%	33.0%	34.9%	34.2%

Source: Authors' estimation based on the 1998 and 2001 household surveys in Nicaragua.

Table 3 shows the corresponding information for 2001, and the change in methodology is evident. Since households were asked not only about the last month, but rather the last 12 months, the share of households reporting receiving remittances is considerably larger, about 43%. On the other hand, the average amount of remittances received is too small, due to the recall problem mentioned above. The average amount of remittances reported in the 2001 survey was only $24/year/person, considerably less than the $64/year/person indicated by the official macro data.

Table 3: The importance of remittances in Nicaragua 2001

Indicators 2001	Household types			
	Extremely Poor	**Moderately Poor**	**Non-Poor**	**Total**
Households that receive remittances (% of all households)	32.5%	37.6%	47.6%	42.8%
Average amount of remittances received (US$/year/person)	5.84	11.53	39.25	24.29
Remittances received (as % of total household income)	6.7%	6.8%	7.2%	7.0%
Average amount of remittances received (US$/year/person) (Only Households that receive remittances)	17.98	29.09	79.93	56.45
Remittances received (as % of total household income) (Only Households that receive remittances)	15.02%	12.99%	12.24%	12.84%

Source: Authors' estimation based on the 2001 household survey in Nicaragua.

Thus, neither the 1998 nor the 2001 household provide a completely correct picture of the importance of remittances, but it is still safe to conclude that remittances constitute an important source of income for many Nicaraguan families, and it is worthwhile to investigate whether this extra income affects the behavior of household members, either positively or negatively.

In the remaining parts of the paper, we use (the log of per capita) remittances received in the month before the survey in 1998, recognizing that the variable is rather restrictive, in the sense that some households that did not receive remittances that particular month may still receive remittances on a regular basis. This means that our results are likely to be biased towards zero (no effect of remittances), but that they should have the correct sign.

3. Remittances and Social Mobility

This section presents the relation between social mobility and remittances in Nicaragua in several different, complementary ways. The most important distinction is between absolute and relative levels of remittances, since a $100 transfer may have very different impacts for a family whose own typical monthly income is $50 than for a family earning $1000 per month. On the other hand, a $1000 transfer probably has more impact than a $50 transfer, so both types of analyses are valid and important.

Social Mobility and Absolute Levels of Remittances

For the purpose of investigating the impact of the absolute level of remittances on social mobility, households were divided into the following three groups:

1) Households receiving no remittances (77% of households)
2) Households receiving moderate amounts of remittances (10% of households)
3) Households receiving substantial amounts of remittances (13% of households)

The division between the latter two groups is found by ordering all the households that received remittances in 1998 by the per capita amount of remittances received, and then divide them into two approximately equal sized groups. The cut-off point is $70/person/year.

For each of these three groups, we construct a Social Mobility Matrix as well as Upward and Downward Social Mobility Indices. Specifically, we estimate dynamic transition probability matrices of the kind illustrated in Table 1. The transition probability A_1, for example, indicates the probability of remaining extremely poor in 2001, given that the person was extremely poor in 1998, and the probability A_2 shows the probability of improving from extremely poor to moderately poor during the three-year time period. Each probability can take on values between 0 and 1. In addition, we have the following three constraints on the values:

$A_1+A_2+A_3 = 1$

$B_1+B_2+B_3 = 1$

$C_1+C_2+C_3 = 1.$

Table 1: A schematic transition probability matrix

	Poverty classification in 2001			
Poverty classification in 1998	**Extreme Poverty**	**Moderate Poverty**	**Non-Poor**	**Total**
Extreme Poverty	A_1	A_2	A_3	**1.000**
Moderate Poverty	B_1	B_2	B_3	**1.000**
Non-Poor	C_1	C_2	C_3	**1.000**

In order to facilitate the analysis of the estimated transition matrices, we construct a Downward Mobility Index (*DMI*) defined as the sum of the three probabilities of worsening one's situation between two time periods:

$$DMI = B_1+C_1+C_2$$

and an Upward Mobility Index (*UMI*) defined as the sum of the three probabilities of improving one's poverty situation between periods:

$$UMI = A_2+A_3+B_3.$$

These mobility indices can be estimated for different sub-groups, for example, individuals from families receiving no remittances, individuals from families receiving moderate amounts of remittances, and individuals from families receiving substantial amounts of remittances in 1998.

If upward mobility is higher for those receiving more remittances, it would be an indication that remittances are used productively to escape poverty in the medium to long run, and not just to alleviate poverty in the short run.

If, on the other hand, upward mobility is lower for those receiving large amounts of remittances, it is a sign of moral hazard problems, in the sense that remittance receiving individuals have lowered their own effort to overcome poverty, under the assumption that migrant relatives will bail them out.

Social Mobility Matrices and Indices estimated using this technique appear in Table 3a-c.

Table 3a: Social Mobility Transition Matrix for households that received no remittances in 1998

	Poverty classification in 2001			***Social Mobility Indices***	
Poverty classification in 1998	Extreme Poverty	Moderate Poverty	Non-Poor	**Upward** [95% conf.int.]	**Downward** [95% conf.int.]
Extreme Poverty	0.546	0.370	0.082		
Moderate Poverty	0.181	0.497	0.321	**0.775**	**0.369**
Non-Poor	0.023	0.165	0.811	[0.756;0.790]	[0.356;0.382]

Table 3b: Social Mobility Transition Matrix for households that received moderate amounts of remittances in 1998

	Poverty classification in 2001			***Social Mobility Indices***	
Poverty classification in 1998	Extreme Poverty	Moderate Poverty	Non-Poor	**Upward** [95% conf.int.]	**Downward** [95% conf.int.]
Extreme Poverty	0.531	0.344	0.123		
Moderate Poverty	0.128	0.416	0.454	**0.923**	**0.338**
Non-Poor	0.001	0.209	0.790	[0.861;0.965]	[0.304;0.365]

Table 3c: Social Mobility Transition Matrix for households that received substantial amounts of remittances in 1998

	Poverty classification in 2001			***Social Mobility Indices***	
Poverty classification in 1998	Extreme Poverty	Moderate Poverty	Non-Poor	**Upward** [95% conf.int.]	**Downward** [95% conf.int.]
Extreme Poverty	0.306	0.373	0.320		
Moderate Poverty	0.146	0.505	0.347	**1.041**	**0.263**
Non-Poor	0.015	0.101	0.882	[0.940;1.102]	[0.222;0.298]

The results show that upward mobility is significantly higher and downward mobility significantly lower for households that receive substantial amounts of remittances (more than $70/person/year) compared to households that receive no or only moderate amounts of

remittances[4]. This suggests either that households are indeed able to apply remittances productively in a manner that helps reduce poverty permanently, or that remittances are a reliable and permanent source of income that helps keep them out of the worst spells of poverty. Results on health spending reported later in this document seem to support the latter interpretation.

Social Mobility and Relative Levels of Remittances

We now repeat the analysis of the previous subsection, using relative levels of remittances instead of absolute levels. That is, we measure remittances as a share of total household income. The cut-off point between moderate and substantial amounts of remittances is set at 23% of household income in order to secure that the latter two groups are of approximately equal size.

For each of these three groups, we again estimate a Social Mobility matrix as well as an Upward and Downward Social Mobility Index as explained in the methodology section. The results for the group receiving no remittances is obviously the same as in the previous sub-section, but the results for the other two groups change as shown in Tables 4b-c.

The results show that upward mobility is significantly higher and downward mobility significantly lower for households that receive remittances compared to households that do not receive remittances. However, moderate relative amounts of remittances (less than 23% of total household income) is better than large relative amounts of remittances, as seen by the lower degree of upward mobility estimated for households where remittances account for more than 23% of total household income.

Together with the results for absolute levels of remittances, this suggests that the impact of remittances on social mobility is positive, but only as long as they don't become a dominant source of income, causing perverse incentives. This finding is strong. We might have

[4] Alternative results using the "crude" measure of remittances are reported in Appendix tables A2a-c. These confirm that more remittances improve upward mobility and reduce downward mobility. Even moderate amounts of remittances appear to have a positive effect.

expected diminishing returns to remittances, but the data show that returns are even negative above a certain level of remittances. This may be due to moral hazard on the part of recipient households, consistent with the suggestion in Chami, Fullenkamp & Jahjah (2003). Our results show that this effect only kicks in beyond a certain level of remittances, i.e., the dependence is nonlinear.

Table 4a: Social Mobility Transition Matrix for households that received no remittances in 1998

	Poverty classification in 2001			***Social Mobility Indices***	
Poverty classification in 1998	Extreme Poverty	Moderate Poverty	Non-Poor	**Upward** [95% conf.int.]	**Downward** [95% conf.int.]
Extreme Poverty	0.546	0.370	0.082		
Moderate Poverty	0.182	0.497	0.321	**0.775**	**0.369**
Non-Poor	0.023	0.165	0.811	[0.756;0.790]	[0.356;0.382]

Table 4b: Social Mobility Transition Matrix for households that received moderate amounts of remittances (in relation to total household income) in 1998

	Poverty classification in 2001			***Social Mobility Indices***	
Poverty classification in 1998	Extreme Poverty	Moderate Poverty	Non-Poor	**Upward** [95% conf.int.]	**Downward** [95% conf.int.]
Extreme Poverty	0.567	0.308	0.124		
Moderate Poverty	0.110	0.391	0.497	**0.930**	**0.301**
Non-Poor	0.004	0.186	0.809	[0.868;0.982]	[0.271;0.321]

Table 4c: Social Mobility Transition Matrix for households that received substantial amounts of remittances (in relation to total household income) in 1998

	Poverty classification in 2001			***Social Mobility Indices***	
Poverty classification in 1998	Extreme Poverty	Moderate Poverty	Non-Poor	**Upward** [95% conf.int.]	**Downward** [95% conf.int.]
Extreme Poverty	0.425	0.384	0.190		
Moderate Poverty	0.167	0.523	0.308	**0.883**	**0.276**
Non-Poor	0.016	0.092	0.890	[0.825;0.916]	[0.246;0.305]

4. Remittances and Recipient Behavior

The results from the previous section on the impact of remittances on social mobility should be backed up by a more detailed investigation of the economic mechanisms behind

the changes in poverty. This section explores how different levels of remittances affect important decisions and behaviors of recipient households. The section is divided into sub-sections analyzing four important household decisions: schooling, labor supply, investment, and consumption. This allows addressing a host of natural questions, e.g., did the individuals who received more remittances in 1998 reduce their labor supply more than the individuals who did not receive remittances? Did children from families who received more remittances become more likely to attend school? Did remittances cause them to change their pattern of consumption and investment?

In order to investigate such mechanisms, we run regressions of the following type:

$$\Delta y_{i,t} = \alpha \boldsymbol{x}_{i,t-3} + \beta r_{i,t-3} + \varepsilon_{I,t}$$

where $\Delta y_{i,t}$ is the change in the relevant decision variable (e.g., hours worked) by individual i between 1998 and 2001, $\boldsymbol{x}_{i,t-3}$ is a vector of control variables including age, sex, years of education, location, number of children in the household, etc. in 1998, and $r_{i,t-3}$ is the natural logarithm of per capita remittances received (the amount of remittances received by the household divided by the number of household members) in 1998. In the case of hours worked, the regression is run for all individuals of working age identified in both surveys. When $\Delta y_{i,t}$ is the change in years of schooling, the regression is run only for the age group which can be expected to study (7-14 years). Finally, $\Delta y_{i,t}$ is also used to reflect changes in consumption patterns at the household level, representing 1) household savings rate, 2) share of total household expenditure dedicated to education spending, 3) share of health spending, and 4) share of luxury consumption.

The procedure of regressing changes in response variables on remittances received in the initial year allows testing whether recipients, all other things being equal, tend to invest more in education, tend to invest more in health, and tend to save more, or conversely if they tend to spend more time on leisure or tend to spend more on current consumption. The fact that remittances are lagged and the dependent variables expressed in first differences allows us to make conclusions about *causality* and not only correlations. This thus

represents a major improvement over several previous studies which, for example, indicate that remittances and poverty are negatively correlated, while being unable to say whether non-poverty causes remittances or remittances cause the escape from poverty (e.g. Adams & Page, 2003). It also reduces the problem of selection bias which mares most cross-section studies (see Acosta, 2005).

Schooling decisions

One of the potential positive long run effects of remittances is that they would help keep children in school, especially during hard times. A study by Cox and Ureta (2003) found that remittances were very important for school retention in El Salvador, especially in urban areas, and especially compared to other sources of income. Costa (2005), however, shows that this result does not hold when taking into account that households that do and do not receive remittances are not similar. A sample selection problem arises because the reception of remittances is conditional on the household having been able to send at least one family member abroad, a condition which many households cannot meet due to the high costs of migrating.

Here we apply the panel data from Nicaragua to test how remittances received in 1998 affect future school attendance. Concentrating on the group of children aged 7-14 in 1998, we calculate the increase in years of education between 1998 and 2001. If everybody in this age group studied full time and did not fail any classes during the period, the average number of years of schooling should have increased by 3 years for this group. In reality the average increase was only 2.11 years, indicating that some children repeated classes or dropped out altogether. In fact, only about 48% of the group stayed in school all the period and obtained 3 additional years of education. The increase in education was generally higher for girls (2.26 years) than for boys (1.97 years), and higher in urban areas (2.36 years) than in rural areas (1.86 years).

The hypothesis to be tested is that remittances help prevent drop-outs, meaning that remittances received in 1998 have a positive influence on the increase in years of schooling between 1998 and 2001.

Table 5 shows that the log-level of remittances per person in 1998 does appear to have a positive impact on the change in schooling levels achieved between 1998 and 2001, but the effect is weak and seems to be confined to rural areas. The overall effect of remittances is smaller than the effect of other sources of income. Thus, these findings differ substantially from those of Cox and Ureta (2003) for El Salvador, where it was found that remittances were much more important for school retention than other sources of income, especially in urban areas.

Table 5: Determinants of the change in education levels of school-age children (7-14) between 1998 and 2001

Dependent variable	**Change in years of education, 1998-2001**		
Explanatory variables	**Total** (N = 3181) $R^2 = 0.151$	**Rural** (N = 1575) $R^2 = 0.131$	**Urban** (N = 1606) $R^2 = 0.091$
ln(remittances per capita 98)	0.023**	0.032*	0.016
ln(other income per capita 98)	0.033***	0.028	0.026
Age 98	-0.128***	-0.131***	-0.115***
Female	0.158***	0.117**	0.197***
Rural	-0.221***	-	-
Number of children in household 98	-0.035***	-0.031*	-0.045***
Change in hours worked per week	-0.003***	-0.003*	-0.004***
Years of education 98	0.175***	0.233***	0.124***
Constant	3.002***	2.740***	3.084***

Note: *** Significant at the 1% level,
** Significant at the 5% level,
* Significant at the 10% level.

Older children improved less than younger children, indicating that the probability of drop-out increases with age, which is natural. On the other hand, those with more years of education in 1998 were more likely to stay in school during the subsequent three years than those who were missing some years. This shows that it is very difficult to get back on track if you have missed or had to repeat a year of education. It is this effect which remittances are supposed to mitigate, by securing the possibility of continued schooling during spells of

poverty, but the regression results indicate that this mechanism does not seem to be very effective.

The other control variables give the expected signs. Rural children improved less than urban children, girls improved more than boys (especially in urban areas), and children with many siblings improved less than children with fewer siblings (especially in urban areas). Finally, children whose workload increased a lot between 1998 and 2001 were not able to improve their education level as much as the children whose workload decreased.

Using other possible measurements of schooling performance (such as change in schooling gap or probability of drop-out) and remittances (share of household income rather than log-levels) all yield insignificant results on the remittance variable, indicating that the slightly positive results reported in Table 5 are not robust to alternative specifications.

Thus, we have been unable to demonstrate a clear positive effect of remittances on schooling decisions in households in Nicaragua.

Labor supply decisions

If leisure is a normal good, basic labor supply theory predicts that people will choose to work less when their non-work income increases (e.g. Fallon & Verry, 1988). Thus, one of the potential adverse effects of remittances is that people might choose to work less and thus limit the supply of labor available for the productive sector. This effect has, for example, been demonstrated by Levitt (2001) who found that young people in Miraflores (a village in the Dominican Republic) were unwilling to work the land and reluctant even to study because they were able to live on the remittances they received from relatives in the US, and expected to migrate to the US themselves in the future. Itzigsohn (1995) found similar effects, also for the Dominican Republic. These results confirm the possibility of Moral Hazard problems for remittance recipients.

On the other hand, labor may not be a scarce factor in the economy, in which case labor demand rather than labor supply would be the critical factor determining the actual number of hours worked. In this case remittances may help overcome some liquidity constraints and allow people to initiate entrepreneurial activities and thus increase hours worked rather than stay unemployed. Woodruff & Zenteno (2001) demonstrate the latter effect in urban areas of Mexico. They estimate that remittances account for 20% of the capital invested in micro-enterprises throughout urban Mexico and conclude that migration and remittances can be instrumental in overcoming liquidity constraints to the implementation of micro-enterprises.

In Nicaragua, the share of 15-65 year olds who work (at least 1 hour per week) increased from 57.1% in 1998 to 58.8% in 2001. During the same period, however, there was a reduction in the average number of hours worked from 48.5 to 46.5 hours/week (for those that did work at least one hour). The net effect of the increase in participation and the reduction in working hours was an average increase in hours worked of 2.11 hours/week per person. In this section we test whether remittances received in 1998 had an effect, either negative or positive, on the subsequent change in weekly hours worked.

Table 6 shows that remittances received in 1998 had a significantly negative effect on the number of hours worked, as classic labor market theory would suggest. The negative effect is mainly found in urban areas, as the coefficient is insignificant in the case of rural areas.

The remaining variables in the regression serve as control variables, and generally have the expected signs. Age and age squared are included to capture the typical inverted U-shaped curve of the labor participation rate by age. Hours worked in 1998 is included to allow for mean reversion, and the negative sign shows that a person working many hours in 1998 was likely to reduce the workload in the future. Better educated people were generally able to increase their number of hours worked more than less educated people, probably indicating that the demand for skilled workers is higher than the demand for unskilled workers. Women increased their work hours significantly less than men, either because they didn't want to work more, or because they were unable to find more work.

Table 6: Determinants of the change in the number of hours worked per person (15-62 years old in 1998) between 1998 and 2001, by location

Dependent variable	**Change in hours of work per week, 1998-2001**		
Explanatory variables	**Total** (N = 6772) $R^2 = 0.375$	**Rural** (N = 3114) $R^2 = 0.382$	**Urban** (N = 3658) $R^2 = 0.392$
ln(remittances per capita 98)	-0.401**	-0.286	-0.468**
ln(other income per capita 98)	0.347**	0.186	0.664**
Female	-15.168***	-22.293***	-10.212***
Rural	-0.576	-	-
Years of education 98	0.244***	0.462***	0.130
Age 98	1.197***	0.755***	1.759***
Age 98 squared	-0.016***	-0.011***	-0.023***
Hours worked per week 98	-0.682***	-0.715***	-0.704***
Constant	8.376***	19.997***	-4.707

Note: *** Significant at the 1% level,
** Significant at the 5% level,
* Significant at the 10% level.

In conclusion, remittances are found to have a significantly negative effect on labor supply in urban areas, indicating that remittances are generally used to buy leisure rather than to invest in entrepreneurial activities to escape unemployment.

Savings, investment and consumption decisions

The dynamic impacts of remittances depend to a large extent on whether remittances are used for consumption or investment. Remittances have been criticized for financing mainly consumption, housing expenditure, and imported luxury goods, thus generating limited dynamic effects and few positive spill-over effects to the rest of the economy (e.g. Böhning, 1975 and Rempel & Lobdell, 1978). This negative view of remittances has been challenged by some empirical studies finding evidence that remittances have a positive effect on investment. Lucas (1987), for example, finds that remittances from migrant gold miners in South Africa greatly increases farm productivity in neighboring countries (Botswana, Lesotho and Malawi) through increased farm investments. Taylor (1992) finds evidence that remittances to farmers in Mexico increases their investment in cattle, which is their main investment opportunity.

In general, however, available empirical studies seem to indicate that remittances tend to be used mostly for basic consumption (e.g. Oberai & Singh, 1980; Gilani, 1981; Russell, 1986; Keely & Tran, 1989; Massey & Basem, 1992; Russell, 1992; Glytsos, 1994; Taylor *et al*, 1996) and residential investment (e.g. Adams, 1991; Adams, 1998; Alderman, 1996; Brown, 1997), with very little left over for productive investment (e.g. Durand *et al*, 1996; Meyers, 1998).

The precautionary model of savings suggests that the marginal propensity to save should be higher from more variable income sources, such as remittances, compared to relatively stable income sources, such as rental income. Adams (2002) shows that this is indeed the case in rural Pakistan, where the marginal propensity to save out of external remittances was found to be very high (0.711) compared to that from rental income (0.085).

In Nicaragua, however, remittances have become a rather regular source of income for many households. More than a third of the households that received remittances in 2001 received them regularly every month. In the remainder of this section we investigate how remittances received in 1998 affect the change in household savings rates between 1998 and 2001.

Table 7 shows that remittances tend to have a positive effect on the household savings rate, although the result is insignificant. In contrast, income from other sources has a significantly positive effect on the household savings rate in urban areas. The results are thus not compatible with the precautionary model of savings, but rather indicate that households may use remittances as a form of insurance, deciding that they don't really need to save for a rainy day because they can usually negotiate a transfer from a richer relative abroad if some crisis arises.

Table 7: Determinants of the change in household savings rates between 1998 and 2001, by location

Dependent variable	**Change in household savings rate, 1998-2001**		
Explanatory variables	**Total** (N = 2447) R^2 = 0.384	**Rural** (N = 1115) R^2 = 0.385	**Urban** (N = 1332) R^2 = 0.389
ln(remittances per capita 98)	0.088	0.016	0.007
ln(other income per capita 98)	0.017	-0.000	0.0505**
Rural	-0.168***	-	-
Household savings rate 98	-0.874***	-0.895***	-0.866***
Number of children in household 98	-0.013	-0.030	0.008
Age of head of household 98	0.012*	-0.003	0.025***
Age of head of household 98 squared	-0.000	-0.000	-0.0002**
Average hours worked per week per person 98	0.003**	0.003	0.003**
Constant	-0.756***	-0.590	-1.314***

Note: *** Significant at the 1% level,
** Significant at the 5% level,
* Significant at the 10% level.

The savings rate used in Table 7 was calculated residually as (total household income - total household consumption)/(total household income), which turned out to be negative for 61% of all households in 1998, probably due to underestimated income. This bias should not dramatically affect the estimation results above, but it is still worthwhile to explore other measures of investment and consumption.

Spending on education and health, for example, should conceptually be reclassified as investment in human capital rather than current consumption. The regression results reported in Table 8 indicate that remittances received in 1998 do indeed have a significantly positive influence on subsequent health spending. Households that received more remittances in 1998 tended to increase their share of spending on health more between 1998 and 2001, other things being equal. Since it is unlikely that remittances actually cause more sickness, this either indicates that remittances allow families to spend more on treating their various health problems, or that remittances are particularly forthcoming in case of urgent medical needs.

Table 8: Determinants of the change in household consumption/investment patterns between 1998 and 2001

Dependent variable	**Change in share of spending on:**		
Explanatory variables	**Education** (N = 2572) $R^2 = 0.218$	**Health** (N = 2572) $R^2 = 0.496$	**Luxury** (N = 2572) $R^2 = 0.255$
ln(remittances per capita 98)	0.038	0.454***	2.969
ln(other income per capita 98)	0.212	0.367***	9.972***
Rural	-1.711**	-0.811*	-10.215
Number of children in household 98	0.683***	-0.656***	-
Share of spending 98	-0.452***	-0.934***	-0.616***
Years of education of head of household 98	0.822***	0.053	5.938**
Female head of household 98	0.782	-0.477	-5.041
Constant	0.561	2.750***	-37.271*

Note: *** Significant at the 1% level,
** Significant at the 5% level,
* Significant at the 10% level.

Educational spending also seems to be positively related to remittances, but the result is not statistically significant, and the coefficient is smaller than for other types of income. This share also increases with the number of children in the household and the education level of the household. The coefficient on the dummy for a female head of household indicates a tendency for women to allocate more of the household budget to education, at the expense of health and luxury goods, but the results are not significant.

The share of spending on luxury goods and services[5] does not seem to increase significantly with remittances, although it does increase with other kinds of income.

Thus, the only really robust effect of remittances on consumption patterns, seem to be on health spending.

[5] For the exact definition of luxury goods see the Glossary at the end of the paper.

6. Conclusions

This paper has shown that remittances are a very important source of income for many Nicaraguan families. More than 40% of all households receive remittances that on average amount to 12-15% of total household income in these households. More than 30% of these households receive remittances at least monthly, implying that it is a relatively stable source of income.

These transfers do tend to reduce the vulnerability of households and increase their upward social mobility, at least as long as the households do not depend too heavily on remittances. If remittances exceed 23% of total household income, upward social mobility is reduced.

The paper has also shown that remittances tend to cause moral hazard problems of the types described by Chami, Fullenkamp and Jahjah (2003). Nicaraguans, especially in urban areas, tend to reduce their labor supply in response to more remittances. Remittances do not seem to allow them to increase savings and investment rates, although it does allow them to spend more on health.

The results thus indicate that remittances work mainly as an insurance mechanism shielding left-behind relatives against adverse shocks (especially health related problems), but they also cause moral hazard problems that tend to create dependence and reduce economic growth in the long run.

Aid vouchers of the kind recommended by Easterly (2002) are likely to work in much the same way as remittances. If they are substantial enough, they can help keep families out of poverty, but they would at the same time tend to create moral hazard problems, causing reduced labor supply in recipient households, which in turn would create increased dependence on aid vouchers.

There is thus a trade-off between immediate poverty alleviation and long-run poverty reduction. However, some kinds of direct assistance, like basic education and basic health

care for the young, are clearly less marred with adverse incentives than others, and thus more obvious candidates for aid.

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Glossary: Definition of Luxury Goods

Goods	Code 1998	Code 2001
Cuidado Estilista, Sauna, Baño Turco, Masaje y gimnasio.	GB2217	S9PB22 – S9PB2COD:17
Libros, Revistas, Suscripciones (Excluye Textos Escolares).	GB2218	S9PB22 – S9PB2COD:18
Discos, Casetes, Entretenimiento, Centros Turísticos, Espectáculos, Cine, Béisbol.	GB2219	S9PB22 – S9PB2COD:19
Lavado y Planchado de Prendas de Vestir Fuera del Hogar.	GB2220	S9PB22 – S9PB2COD:20
Rifas y Loterías.	GB2222	S9PB22 – S9PB2COD:22
Empleada Doméstica, Lavandería, Chofer, Jardinero, Vigilante.	GB2223	S9PB22 – S9PB2COD:23
Cable Para Televisión, Internet y Bipper.	n.d.	S9PB22 – S9PB2COD:25
Reparación y Mantenimiento del Vehículo para Uso del Hogar.	GB3205	S9PB32 – S9PB3COD:05
Reparación de Cocinas, Planchas, Lavadora, Refrigerador, etc.	GB3206	S9PB32 – S9PB3COD:06
Vajillas, Ollas, Bandejas, Cucharones y Otras.	GB3207	S9PB32 – S9PB3COD:07
Floreros, Figuras de Porcelana, Cristal y Otros Adornos.	GB3208	S9PB32 – S9PB3COD:08
Juguetes y Artículos Deportivos	GB3211	S9PB32 – S9PB3COD:11
Fiestas y Regalos (Excluye Alimentos y Bebidas).	GB3212	S9PB32 – S9PB3COD:12
Envío de Dinero y/o Bienes a Hijos Fuera del Hogar, y Otros.	GB3213	S9PB32 – S9PB3COD:13
Donación a Entidades de Caridad o Particulares	GB3214	S9PB32 – S9PB3COD:14
Mejoras y Reparación en la Vivienda.	GB4201	S9PB42 – S9PB4COD:01
Muebles y Accesorios, Comedor, Sala, Dormitorio, Reparación, etc.	GB4202	S9PB42 – S9PB4COD:02
Cocinas, Plancha, Lavadora, Refrigerador, Radio u otro Electrodoméstico.	GB4203	S9PB42 – S9PB4COD:03
Secadora, Onduladora y Afeitadora Eléctrica.	GB4204	S9PB42 – S9PB4COD:04
Pasajes Nacionales e Internacionales	GB4205	S9PB42 – S9PB4COD:05
Hoteles, Hosterías, y Tours de Viajes. (excluye Pasajes).	GB4206	S9PB42 – S9PB4COD:06
Servicios Profesionales de Abogados, Contadores, etc.	GB4207	S9PB42 – S9PB4COD:07
Compra de Carro para Uso del Hogar.	GB4208	S9PB42 – S9PB4COD:08

Compra de Bicicleta y Motocicleta.	GB4209	S9PB42 – S9PB4COD:09
Multas, Matrículas del Vehículo y Licencia de Manejo.	GB4210	S9PB42 – S9PB4COD:10
Relojes, Artículos de Fantasía y Joyería. (incluye reparación).	GB4211	S9PB42 – S9PB4COD:11
Compra de Lentes, Audífonos, Placas y Puentes dentales.	GB4212	S9PB42 – S9PB4COD:12
Impuestos a la Renta, Rodaje y la Propiedad. (excepto la tierra).	GB4213	S9PB42 – S9PB4COD:13
Seguros Privados de Enfermedad, Vida, Vehículos y Otros.	GB4214	S9PB42 – S9PB4COD:14
Ceremonias Religiosas Matrimonios, Funerales y Afines.	GB4215	S9PB42 – S9PB4COD:15
Aportes a Clubes y Asociaciones.	GB4216	S9PB42 – S9PB4COD:16
Otros Tramites Legales.	GB4217	S9PB42 – S9PB4COD:17
Accesorios para Bebe (Cochecito, Andarivel, Chineador, etc.).	n.d.	S9PB42 – S9PB4COD:18