

# **Moving Forward, Looking Back: The Impact of Migration and Remittances on Assets, Consumption, and Credit Constraints in the Rural Philippines**

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### **Abstract**

This paper investigates the impact of migration and remittances on asset holdings, consumption expenditures, and credit constraint status of households in origin communities, using a unique longitudinal data set from the Philippines. The Bukidnon Panel Study follows up 448 families in rural Mindanao who were first interviewed in 1984/85 by the International Food Policy Research Institute and the Research Institute for Mindanao Culture, Xavier University. The study interviewed the original respondents and a sample of their offspring, both those who have remained in the same area and those who have moved to a different location. This paper examines the impact of remittances from outside the original survey villages on parent households, taking into account the endogeneity of the number of migrants and remittances received to characteristics of the origin households and communities, completed schooling of sons and daughters, and shocks to both the origin households and migrants. When both migration and remittances are treated as endogenous, a larger number of migrant children reduces the values of nonland assets, total expenditures per adult equivalent, and some components of household expenditures. On the other hand, remittances have a positive impact on housing and consumer durables, nonland assets, and total expenditures (per adult equivalent). The largest impact of remittances is on the total value of nonland assets (driven by increased acquisition of consumer durables) and on educational expenditures. Thus, despite the costs that parents may incur in sending migrants to other communities, the returns, in terms of remittances, play an important role in enabling investment in assets and human capital in sending communities. Neither migration nor remittances affects current credit constraint status.

**Key Words:** migration, remittances, Philippines, household investment, credit constraint.

**JEL:** O15, O13.

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*Ang hindi marunong lumingon sa pinanggalingan ay hindi nakakarating sa pinaroroonan.*  
“One who does not know how to look back to one’s origins will never get to one’s destination.”

Jose Rizál, 1861-1896, Filipino national hero

## **1. Introduction**

Migration is an important livelihood strategy in the Philippines. Between 1980 and 1990, the number of persons over the age of five years who were not resident in the city or municipality they resided in five years ago increased from 2.85 to 3.24 million (Flieger 1995). Although the number of internal migrants has increased between 1980 and 1990, the proportion of the population above four years engaged in internal migration had decreased from 7.1 percent to 6.3 percent between 1980 and 1990. In comparison, more than 1.6 million international migrants over 15 years of age resided outside the Philippines in 1991, equivalent to 4% of the nonmigrant population of that age group residing in the country (Rodriguez and Horton 1996). In June 1997, about 6% of households in the Philippines had one or more members working overseas (Yang 2004). Moreover, in the 10-year period between 1990 and 1999, remittances from international migrants contributed an average of 20.3 percent to the country’s export earnings and 5.2 percent of GNP (Go 2002).

Despite the large literature on the determinants of migration, there has been relatively little empirical work on the impact of benefits accruing to source communities. The early literature on migration typically posed the migration decision in terms of the costs and benefits to the individual migrant (e.g., Sjaastad 1962). Recent studies (Stark 1991; Lucas 1997) emphasize the role of migration as a family strategy.<sup>1</sup> In this framework, families decide which individuals

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<sup>1</sup> See Lucas (1997) for a review of the literature on internal migration, and Stark (1991) for a discussion of migration as a family, rather than a purely individual, decision.

migrate and the characteristics of the migrants and the family determine the amount of remittances that migrants send home. Migrants can help families smooth their consumption and therefore manage risk (Rosenzweig and Stark 1989). In general, more empirical work has been done on the consumption-smoothing or consumption-augmenting aspects of migrants' remittances than on their investment or productivity impact.

An emerging body of work draws from the New Economics of Labor Migration (NELM) to examine impacts of migration on the productivity of sending communities. The NELM posits that, in the presence of imperfect markets or credit constraints, migration may complement productivity growth in the farm sector by relaxing credit or risk constraints; however, it may also exacerbate labor shortages, leading to negative net impacts on farm incomes in sending communities (Stark 1991). Empirical tests of this hypothesis include Lucas (1987), Taylor (1992), Benjamin and Brandt (1998), Rozelle, Taylor, and de Brauw (1999) and Taylor, Rozelle, and de Brauw (2003). Understanding the impacts of migration and remittances on a broad range of outcomes in sending communities is an important contribution to the policy debate regarding migration. While some countries, notably China, restrict migration, others, like the Philippines, visibly encourage it.

This paper explores the impact of migration and remittances on asset holdings, consumption expenditures, and credit constraint status of households in origin communities, using a unique longitudinal data set from the Philippines. The Bukidnon Panel Study follows up 448 families in rural Mindanao who were first interviewed in 1984/85 by the International Food Policy Research Institute and the Research Institute for Mindanao Culture, Xavier University. The study interviewed the original respondents and a sample of their offspring, both those who have remained in the same area and those who have moved to a different location. Parents

(original respondents) and children who formed separate households in the same locality were interviewed in 2003; offspring that migrated to other rural and urban areas were interviewed in 2004. This paper focuses on the impact of migration and remittances from outside the original survey villages on parent households, taking into account the endogeneity of migration and remittances to characteristics of the origin households, characteristics of the sending communities, characteristics of the potential stock of migrants, and shocks to both origin households and migrants.

## **2. Understanding Migration Patterns in the Rural Philippines**

### **2.1 Motivation**

In contrast to early models of migration that focused on an individual's decision to migrate, based on a comparison of the discounted value of the mover's expected income in a different location and the present value of the costs of migration (e.g., Sjaastad 1962), a growing literature has argued that individual migration is both an individual and a family decision. Taking family considerations into account has considerably expanded the scope of migration models. In their study of the migration of husbands and wives in peninsular Malaysia, Smith and Thomas (1998) discuss a number of scenarios in which family characteristics may influence the migration decision. For example, children and adolescents typically move with their parents, who decide where the family goes. For these younger migrants, parental characteristics, such as father's and mother's education, may be more important determinants of an individual's location than individual characteristics. The family also matters because individuals marry and mostly live and move with their spouses. Thus spousal characteristics may affect an individual's location decision, particularly for postmarital moves.

Families may also choose which of their members will migrate in order to diversify against risk (e.g., Lucas and Stark 1985; Hoddinott 1992). If parental investment and risk-diversification strategies are consistent, an individual's probability of migration, and eventual location, will be a function of individual and household characteristics. In India, Rosenzweig and Stark (1989) find that Indian farm households with higher variability in profits tend to engage in longer distance marriage-cum-migration. Similarly, Rosenzweig (1993) and Rosenzweig and Stark (1989) find that children of poorer households are more likely to migrate far away. They propose that children of households that are more vulnerable to exogenous risk tend to migrate farther afield than other children. Likewise, children of households that are better able to self-insure against exogenous risk – an ability that generally increases with wealth – may choose to reside closer to the origin household. For example, children whose families live in areas that are inherently prone to weather risk, such as drought or floods, are more likely to migrate. In contrast, children whose families have more assets, and thus are better able to self-insure, do not need to live so far away from the parental household. This is another way families can use migration as insurance.

Whether sons or daughters migrate depends on the family's perception of the migrant in its risk-diversification strategy. If, for example, daughters are socialized to be responsible for their parents, families may invest in daughters' migration. In the Dominican Sierra, female migrants make remittances to their parents' households if the latter experience income shocks; men insure parents only if there is no other migrant in the household (de la Briere et al. 2002). In the Philippines, the family's short-run need for a stable source of income motivates unmarried female migrants to seek wage-earning jobs, despite their lack of long-term stability, since parents expect remittances to decrease after daughters marry and have their own familial obligations

(Lauby and Stark 1988). In rural India, where women migrate for marriage but men are lifetime residents in the household and village, daughters-in-law living in the village and daughters of the household head who have married and moved to their husbands' village embody the family's insurance capital, linking families of origin and destination of married women in mutual aid schemes (Rosenzweig 1993).

The process of migration may involve both costs and benefits for sending families. Sending families may have to incur both initial and recurrent expenses associated with migration, especially if migration is for further schooling. Families may also need to trade off the potential loss of labor due to migration, versus the positive impact of remittances from migrants. Empirical tests of the NELM in China (Taylor, Rozelle, and de Brauw 2003) finds that the loss of labor to migration has a negative effect on household crop income in source areas, although it does not reduce crop yields, in contrast to their earlier finding (Rozelle, Taylor, and de Brauw 1999). Remittances sent home by migrants partially compensate for the lost-labor effect, contributing to household incomes directly and indirectly by stimulating crop production.

## **2.2 The Bukidnon Panel Survey**

The data used in this analysis draws from a survey conducted by the International Food Policy Research Institute (IFPRI) and the Research Institute for Mindanao Culture, Xavier University (RIMCU) of households residing in southern Bukidnon, Philippines. Bukidnon is a landlocked province in Northern Mindanao, comprising 20 municipalities and two cities, Malaybalay and Valencia. Inter-provincial travel is mainly by bus while inter-municipality and

*barangay* travel is via public utility vehicles.<sup>2</sup> Since Bukidnon is landlocked, it relies on Cagayan de Oro, the major metropolitan center in Northern Mindanao, as its nearest seaport.

The original survey in 1984/85 investigated the effects of agricultural commercialization on the nutrition and household welfare of these rural families. In 1977, the Bukidnon Sugar Company (BUSCO) began operating a sugar mill in the area, which had previously been dominated by subsistence corn production. The presence of the mill gave farmers the opportunity to adopt this cash crop, depending on their proximity to the mill. The survey was fielded in four rounds at four-month intervals from August 1984 to December 1985, so that each round corresponded to a different agricultural season. The survey contained information on food and non-food consumption expenditure, agricultural production, income, asset ownership, credit use, anthropometry and morbidity, education and 24-hour food consumption recall. The initial sample included 510 households, although 448 households were interviewed in all four rounds. Bouis and Haddad (1990) provide a detailed description of the sample design and survey area.

Following qualitative studies conducted in the study communities in early 2003, IFPRI and RIMCU returned to conduct two rounds of quantitative data collection using a survey questionnaire that closely reflected the one used in 1984/85. The first wave of data collection in the fall of 2003 interviewed all original respondents still living in the survey area. We were able to contact 311, or 61 percent, of the original respondents. The respondents listed all children who lived away from home, providing contact information for non-coresident children. We sampled at random up to two non-coresident children living in or near the origin household's village, yielding 261 households. The second wave of data collection began in April 2004 and ended in

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<sup>2</sup> The *barangay* is the smallest local government unit in the Philippines and is similar to a village. Municipalities and cities are composed of *barangays*. Historically, *barangays* are relatively small communities of 50 to 100 families. Most villages have 30 to 100 houses and the population varies from one hundred to five hundred persons (Constantino 1975).

July 2004. In this wave, the survey team interviewed any household formed by children who no longer live in their origin *barangays*. This included a large group of households in three major urban areas in Mindanao (Valencia, the commercial center of Bukidnon; Malaybalay, the provincial capital; and Cagayan de Oro in the province of Misamis Oriental, a major port and metropolitan area in northern Mindanao) as well as many households in *poblaciones* and other rural areas of Bukidnon. The sample size from this migrant wave consisted of 257 households—about 75 percent of potential migrants to be interviewed. While budgetary concerns did not allow us to interview all children, the survey nonetheless contains data on children who migrated to a variety of rural and urban locations. The initial interview with the parents obtained a basic set of information about all children, including location, educational attainment, and marital status. Obtaining this information from parents, plus assiduous follow-up of migrants and children residing in the community, avoided the common problem of sample selection bias if interviews were based only on residence rules (Rosenzweig 2003).<sup>3</sup> Because we are interested in using information from 1984 as instruments for current participation in groups, in this paper we restrict the sample to those parents who were interviewed in 1984/85 and 2003. All descriptives therefore refer to the sample of parent households. We discuss our procedure for addressing attrition bias below.

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<sup>3</sup> There is evidence suggesting that panel survey rules that condition on residence provide nonrandom subsamples of the baseline households (Thomas et al. 2001; Foster and Rosenzweig 2002). If households do not divide randomly, residence-based sampling rules may bias estimates of economic mobility (Rosenzweig 2003). One important source of selection bias is children's decision to marry and leave the parental home. Only those who remain in their original households are actually resurveyed, making estimates biased because they are based on "stayers." Panel surveys using residence-based interview rules typically exclude both individuals who leave their parental residence, but remain in the same village, as well as those who have migrated to different localities. Studies of migrants also rarely link them back to the original household. There are, of course, exceptions, including the Malaysian Family Life Survey, the Indonesian Family Life Survey, the INCAP-based Human Capital Study and the Bangladesh Nutrition Survey of 2000, to name a few.

## 2.3 Characteristics of Migrants and Migrant Networks

Table 1 presents the distribution of children 15 and over of original respondents, based on their current location.<sup>4</sup> In these tables, children are classified into nonmigrants, rural migrants, peri-urban migrants, urban migrants, and overseas migrants based on the addresses given by their parents. Because the original sample was rural, all migration in the present sample is necessarily rural to another destination.

About 53 percent of children 15 and over are non-migrants: of these, two thirds coreside with parents and one third lives in the same barangay but in separate households. A substantially higher proportion of males are nonmigrants (61.8 percent vs. 43.5 percent for females), consistent with national trends. The proportion of males coresiding with parents (44.6 percent) is much higher than the proportion of females (24.9 percent). Men have higher coresidence rates because women are more likely to migrate as teenagers, with a high proportion of women's migration occurring well before marriage (Lauby and Stark 1988). Roughly equal percentages of males and females—between 17 to 18 percent--have formed separate households in the same village. Many of these live on a portion of the family farm or homestead that has been allotted to the child upon his or her marriage.

Approximately 15 percent of all children have migrated to other rural areas – a slightly higher percentage of females than males – and roughly 7 percent have migrated to *poblaciones* or peri-urban areas, with again, slightly more females than males. Twenty three percent of the children surveyed have moved to urban areas, with significantly higher migration rates among

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<sup>4</sup> The cut-off of 15 years old could overstate the “non-migrant” population because migration may occur more often at an older age, but this age is consistent with other demographic studies. An older cut-off would not change the results substantially. However, our analysis will focus on migrants 21 years and older, because the period between 15-21 years is typically characterized by continuation in school as well as early labor market experience, which may make it difficult to disentangle the net impact of migration.

females. Finally, only 1.8 percent of children have gone abroad, with yet again, more females than males represented among overseas migrants. In another paper (Quisumbing and McNiven 2005), we analyze both the determinants of each individual's location—both migrants and nonmigrants—as well as the primary reasons for migration, based on the 2004 wave that surveyed migrant children. For both sexes, moves to urban areas are often for school, while moves to all other areas are most commonly to start a new job. Women are more likely to migrate for marriage. The first time a person moved away from home, it is most likely for schooling, since better quality or higher levels of schooling are available in urban and peri-urban areas. Subsequent moves are rarely for education.

We use information from the household survey and the parents' listing of all children to characterize households and their potential migration network. We restrict the parent households to the 295 who were sampled in 2003 and in all 1984/85 rounds, and for whom we have complete data. Table 2 shows that in 2003, the mean age of the household head was almost 55 years old; household heads had completed 5.8 years of schooling. Parent households have 2.4 males 15 years and older, on average, 1.8 females 15 years of age and older, and 1.5 household members less than 15 years of age. The last statistic reflects the tendency of many Philippine households to be intergenerationally extended, although the nuclear family is the norm – 28% of parent households have grandchildren living in them. Parents have, on average, two sons and two daughters.

We define the parents' migrant network as its migrant children.<sup>5</sup> Very few households have no migrant network. Only 16% of parent households do not have children living in another locality, in sharp contrast to the Chinese villages studied by Rozelle, Taylor, and de Brauw

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<sup>5</sup> Interestingly, there are very few remittances from spouses who have migrated. Parent households report only 8 transfers from migrant spouses, and child households report only one transfer from a migrant spouse.

(1999), where households with migrants consisted only of 17% of the sample. Indeed, 80 percent of parent households have a child 21 years of age and older who does not live in the same barangay. Reflecting the higher propensity of women to migrate (Quisumbing and McNiven 2005), 60 percent of households have an adult son who is a migrant, while 73 percent of households have an adult migrant daughter. On average, parents have 2.17 migrant children-- .91 migrant sons and 1.26 migrant daughters. A larger proportion of migrant daughters than sons are married, since marriage is one of the primary motives for female migration. As adults, daughters have slightly higher completed years of schooling than sons—7.89 versus 7.29 years—but the schooling gap is larger among migrant children. Female migrants age 21 and over complete on average 10 years of schooling compared to just 8.8 for their migrant brothers, a difference that is statistically significant at 0.001.

Remittances are defined as total receipts received from outside the origin village in the past 12 months. Sixty-two percent of parent households receive remittances from outside the village. Among all parents, a mean of 11,869 pesos were received, 49% of which comes from their migrant children, 38% from their own parents, 9% from siblings, and 4% from others.

Table 3 reveals that migrants to urban areas report sending more money (3,258 pesos) than migrants to other areas and children who stay in the same barangay (417 pesos). Looking at this from the perspective of the parent household, the story becomes less clear. Parent households with a migrant in an urban area receive more remittances than households without a migrant in an urban area (14,513 pesos compared to 9,019 pesos), but this difference is not statistically significant, probably because of the high variability in remittance receipts in a given year.

## 2.4 Characterizing Credit Constraints of Sending Households

One of the motivations of this analysis is examining the impact of remittances on credit constraints. To do so, one needs to define the household's credit constraint status.

### *Credit constraint status in 1984/85*<sup>6</sup>

The data on credit use in the 1984/85 survey includes principal amount borrowed, source of loan and repayment conditions by round (only in rounds 2-4) in each of four crop-specific agricultural production modules: one each for sugar, corn, rice and other crops. Data on borrowing was also collected for non-production loans in survey modules on agricultural wage labor (for loans paid back through labor) and other income sources. Also, in the food consumption expenditure module, respondents were asked whether the foods listed were purchased with credit, but not the amount borrowed.<sup>7</sup> In rounds 2-4, farmers were also asked about credit constraints in the agricultural production modules. For each crop produced, they were asked:

1. "If more production credit had been available to you for [crop] production in the past four months, would you have used it?"
2. "If yes, how would you have used it?"
3. "If no, why not?"<sup>8</sup>

This method of direct elicitation of credit constraints could capture most sources of credit constraints, including quantity rationing, transaction costs, and discouraged or risk-rationed borrowing, subject to several important caveats. In principle, households facing quantity

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<sup>6</sup> This discussion draws heavily from Gilligan et al. (2005).

<sup>7</sup> Because credit data were collected by activity in the 1984/85 survey, it was not always possible to determine whether the same loans were being referenced in different modules of the survey. In most cases, it was possible to differentiate loans by principal amount borrowed, date borrowed, and repayment terms. When distinct loans could not be identified, we assumed each reported incidence of credit use represented a new loan.

<sup>8</sup> Question 3 was asked only in survey rounds 3 and 4.

rationing should answer yes to question 1. Households with zero borrowing because of high transaction costs for obtaining a loan should also answer yes to question 1, since the wording of the question suggests that transaction costs would be reduced to make the loan available. Less clear is how effective this question would be at capturing credit constraints due to a moderate level of transaction costs that leaves the household with positive borrowing. Pre-coded responses to question 3 included fear of losing collateral, so this question should be able to identify risk rationed or discouraged borrowers.<sup>9</sup>

Based on responses to the three questions listed above, Gilligan et al. (2005) developed two indicators of credit constraint status that are also used in the current paper. In the first, households answering “yes” to question 1 in any of the four crop modules were classified as credit constrained for that round of the survey. In the second approach, risk-rationed borrowers identified by question 3 are added to the list of constrained households. In the first classification, 245 households were credit constrained in at least one round and 130 households were never credit constrained. The remaining 73 households were not agricultural producers. These households did not have the opportunity to answer the credit constraint questions because they did not produce any crops. By round, 36.4% of those responding reported being credit

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<sup>9</sup> There are some shortcomings in using these three questions to capture credit constraints. The terms of the hypothetical loan that would be made available to the household are not clearly specified in question 1. Feder et al (1990) and Barham, Boucher and Carter (1996) add a phrase like “at going rates of interest” to this question. The omission of such a phrase is a limitation of the Bukidnon data, both in the 1984/85 survey and the 2003/2004 resurvey. However, even when similar phrases are included, it is unclear how the respondent chooses the loan characteristics (interest rates, length of repayment, collateral requirements) on which to judge his desire for more credit. From these questions, we do not know if the respondent considers the average terms of loans recently taken or the likely terms of his next best, or marginal, source of credit, which would be less favorable. For respondents with little or no recent experience in the credit market, errors in judging the probable terms of this hypothetical loan may be great. Moreover, the hypothetical nature of the question may lead to inflated reports of credit constraints because respondents are not immediately faced with the burden of paying back the hypothetical loan. Finally, the context in which these questions were asked in the Bukidnon survey (loans for production of specific crops) suggests that some households that were credit constrained for consumption or other purposes were inaccurately classified as unconstrained. In the 2003/2004 survey (discussed below), we attempt to rectify this shortcoming by asking about credit constraints in other production and consumption contexts.

constrained for at least one crop. However, many of these (43.2%) reported being unconstrained in credit access for at least one other crop. This combination of responses may arise if the household prioritizes financing for its primary crop, and does not expect to require financing on secondary crops. In some cases, these secondary crops require few purchased inputs. Indeed, only 6.5% of respondents indicated being credit constrained for more than one crop.

The second classification, which includes risk-rationed borrowers in the credit constrained cohort, can only be constructed for rounds 3 and 4, when question 3 was included. For those households responding in rounds 3-4, 59.7 percent of completed household-round observations were constrained by the measure including risk-rationed borrowers, compared to 41.3 percent constrained by the first classification in these two rounds. This high frequency of risk-rationed borrowers suggests that elicitation methods based only on rejected loan applications may be missing a potentially large group of constrained borrowers.

### *Credit constraint status in 2003*

The resurvey in 2003 provided the opportunity to modify the questions for directly eliciting credit constraint status. However, if the questions themselves were modified along the lines suggested by Boucher (2002), they would no longer be comparable to the 1984/85 questions. In the interests of comparability, we decided to use the same wording as in 1984/85, but to ask the following questions about credit constraints after the nonagricultural production, livestock production, assets, and nonfood consumption modules.<sup>10</sup>

1a. “If more production credit had been available to you in the past 12 months, would you have used it?<sup>11</sup>”

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<sup>10</sup> No question related to credit constraints affecting food consumption was asked in the food consumption module even though credit use was collected in this module.

<sup>11</sup> This question was asked at the end of the block collecting information on agricultural production activities and input use. It was also asked after the backyard production module (including livestock and home gardens) but

1b. “If more credit had been available to you for your business in the past 12 months, would you have used it?<sup>12</sup>”

1c. “If more credit had been available to you in the past 12 months to finance any of those items, would you have used it?<sup>13</sup>”

Each of the above questions was followed by:

2. “If yes, how would you have used it?”

3. “If no, why not?”

Question 1a was asked to households that reporting farming activity but not reporting a non-agricultural business (358 of the 572 survey households and 63% of the sample), while question 1b was asked to households reporting farming activity and a non-agricultural business (162 households, 28%). Question 1c was asked to all households following the nonfood consumption and nonland asset blocks. Answers to question 3 allow us to classify households according to type of credit rationing.

For comparability with Gilligan et al. (2005), we limit our analysis to agricultural producers, here defined as those reporting farming activity but not reporting a non-agricultural business. Despite attempts to ensure comparability, the new questions differ slightly. The 1984/85 survey repeats the credit constraint questions, referring to the prior four months, for each of the four rounds for each crop under production. In contrast, the 2003 asks the questions only once per household in reference to an entire agricultural year.

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responses in the backyard production module are likely to be unreliable because respondents do not typically borrow money for these activities. In some cases, respondents do not realize that they are engaged in quasi-tenancy arrangements (for example, acquiring livestock through tenancy arrangements in which the caretaker acquires alternate offspring of livestock left under his or her care).

<sup>12</sup> This question was asked at the end of the block collecting information on non-agricultural business.

<sup>13</sup> This question was asked at the end of the non-food expenditure, assets, and livestock production block.

Table 4 presents the distribution of households by credit constraint status in 1984/85 and 2003<sup>14</sup>. Depending how we define risk rationing, we arrive at one of two definitions of a constrained household, one being quantity- and risk-constrained households, the other being households that are quantity-constrained but not risk-constrained. The first definition consists of those that were quantity-constrained or afraid of being unable to repay the loan. This amounts to 75 percent of parent households and 74 percent of child households. The second definition includes households that were quantity-constrained, unaccustomed to borrowing, afraid of losing collateral, or having too much debt. This definition is more exclusive, covering only 39 percent of parent and 36 percent of child households. Following Gilligan, we use the first definition of risk-rationing. While the proportion of quantity-rationed households has changed little, decreasing from 36 to 34 percent, the proportion of quantity- or risk-rationed households has increased significantly from 59 to 75 percent. Fear of losing collateral is not an important motivation underlying risk rationing, since nearly 60 percent of loans do not involve collateral (Godquin and Sharma 2004). Indeed, only 5 percent of parent households and 1 percent of child households mention fear of losing collateral as the reason for refusing additional credit.

Even though the proportion of quantity-rationed households has remained steady, many households have moved across credit constraint categories over the past twenty years. For the 198 households for whom we have data on credit constraints in both periods, 53 percent have not changed credit constraint status. Twenty seven percent who were not credit constrained in the past are still unconstrained in 2003, whereas 28 percent of those who were constrained have remained so. Forty percent of those who were quantity-rationed in 1984/85 are no longer rationed, while six percent of those who were not quantity-rationed in 1984/85 report being

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<sup>14</sup> The 1984/85 figures are an average over the relevant rounds, each of which has a recall period of four months, while the 2003 figures refer to the past 12 months.

rationed in 2003. In related work, Sharma (2006) shows that past credit constraint status affects neither current credit market behavior nor current credit constraint status, probably owing to the growth of the financial sector and the evolution of financial (and other) institutions over the past two decades.

Nevertheless, credit constraints may have persistent long-term impacts. Ongoing work using this data set (Quisumbing 2006) suggests that past credit constraints, defined as being quantity rationed in at least one round in 1984/85, have negative impacts on current asset holdings, intergenerational asset transfers from parents to children, and current consumption. Other evidence using this data set (Gilligan 2006) suggests that constrained households are also disadvantaged with respect to adult nutritional status and educational attainment, with children from constrained households having lower stature as adults, and fewer years of schooling, compared to those from unconstrained households. Remittances may therefore enhance welfare now and in the future by permitting households to make investments in assets as well as in children's human capital, if remittances have an impact on credit constraints, or a stronger positive impact on credit constrained households.

#### **2.4 Attrition and Selectivity**

Because the 2003 survey was conducted 19 years after the first survey round in 1984, we expect that some households would have left the sample, whether due to death, migration, or refusal to be interviewed. While a complete attrition analysis is outside the scope of this paper (see McNiven and Gilligan 2005 for a fuller analysis), we need to control for attrition if the factors that lead households to leave the sample create biases in our estimates of the impact of migration and remittances. Drawing from analysis in Godquin and Quisumbing (2007), we control for attrition by accounting for the probability that the household is reinterviewed in 2003.

We use a Fitzgerald-Gottschalk-Moffitt (1998a, 1998b) correction for attrition, where selection is based on observables.<sup>15</sup> We posit that the reinterview probability is a function of the household head's age, age squared, years of schooling, log of household size in 1984, the dependency ratio in 1984, the position in the asset distribution, whether the household was a sugar producer in 1984, an agricultural household in 1984, or engaged in a nonagricultural business in 1984, distance from the household (in 1984) to the town center, measures of heterogeneity in 1984, peace and order problems, and government and nongovernment programs in the community in 2000-2001. In addition, we hypothesize that the following variables affect the interview probability but not the outcome under study: the share of female working age members in 1984, the percentage of other households interviewed in the village between 1984/85 and 2003, which proxies interview quality in 1984/85 (Maluccio 2004), and the percentage increase in the number of households in the village between 1980 and 2000. Means and standard deviations of these variables are found in Appendix Table A1.

Appendix Table A2 shows the results of the augmented probit regression with a subset of variables directly affecting attrition, but conceivably not the outcome being studied. An F-test of the hypothesis that the coefficients on the factors determining attrition are jointly equal to zero is rejected at  $p < 0.0001$ . Attrition weights are computed as the ratio of the predicted probability based on the set of regressors described above and the predicted probability based on the augmented set of regressors—which includes all the previously mentioned regressors plus those affecting attrition directly. The subsequent estimation results in the paper use attrition weights.

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<sup>15</sup> Fitzgerald, Gottschalk and Moffitt (1998a) show that weighted least squares can generate consistent parameter estimates when selection is based on observables, even when they are endogenous.

### 3. Analyzing the Impact of Remittances on Assets, Consumption, and Credit Constraints

#### 3.1 Model and Empirical Specification

Migration is an investment that entails both costs and returns. Costs of migration include the costs of moving to a new locale, the cost of supporting the migrant while he or she is in school or while looking for a new job, as well as the social and psychological costs of adjusting to a new place. While there may be nonmonetary returns to migration in terms of increased exposure to outside influences and dissemination of new knowledge and technology, in this study, we focus on monetary returns in the form of remittances.

We are ultimately interested in the impact of migration and remittances on a vector of outcomes,  $Y$ . This vector consists of asset outcomes, consumption outcomes, and credit constraint status (we define these outcomes later in the empirical work). Levels of assets  $A$ , consumption per adult equivalent  $C$ , and credit constraint status  $K$  depend on the number of migrants  $M$ , remittances  $R$ , characteristics of the origin household  $X_o$ , shocks experienced by the origin household  $S_o$ , and an error term  $\mu$ .

$$Y = \alpha_0 + \alpha_1 M + \alpha_2 R + \alpha_3 X_o + \alpha_f S_o + \mu \quad (1)$$

We define the migrant stock  $M$  as the number of children age 21 and over who do not live in the same barangay and remittances as the amount of transfers (in cash and in kind) received by parents from outside the village where they reside. The vector of origin household characteristics  $X_o$  includes: age and age squared of the household head in 2003, household head's years of schooling in 2003, the log of the net worth of nonland assets in 1984/85, area cultivated in 1984/85, and household demographic composition (males and females older than 15

years of age, household members 15 and below). We use 1984/85 values of nonland assets as regressors because current asset levels may be influenced by remittance receipts.

We include cumulative shocks from 1984 to 2002 in equation (1) because of the possibility that shocks experienced in the past may have long-term or persistent impacts. While a large literature has shown that poor people are generally able to insure against idiosyncratic shocks, but not against aggregate shocks (see Skoufias and Quisumbing 2005 for a review of the literature), most of this literature has been based on short-term panels. Case studies and casual observation suggest that a sequence of positive (negative) shocks may propel some households onto a rising (falling) welfare trajectory that results in changes in their long-term position in the welfare distribution, see Scott (2000) for an example. A “lucky few” may experience a run of positive shocks that enable them to escape poverty, while an “unlucky few” suffer a run of negative shocks that forces them into destitution. The majority of households will, however, experience a mixture of positive and negative shocks that partially offset themselves over time. Very few longitudinal studies are sufficiently long and collect enough retrospective information to allow such sequences of shocks to be identified. Using a modification of the shocks module in Hoddinott and Quisumbing (2003), we use information on shocks experienced by the household between 1985 and 2002 (the year preceding the resurvey year) to create the cumulative shocks variable.<sup>16</sup>

Because both migration and remittances are the outcomes of behavioral decisions by parents and migrants, failure to take into account their endogeneity would lead to biased

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<sup>16</sup> In the survey, households were asked the following question: “Since 1985, has this household been affected by a negative shock, an event that resulted in a loss of income or caused you to become seriously concerned or anxious about your households' welfare? Those event or shocks can be related to agriculture, political or social events, family and other, as long as they have resulted in a loss of income or caused you to become seriously concerned or anxious about your households' welfare.” The cumulative shocks variable adds up the number of shocks mentioned by the household between 1985 and 2002.

estimates of their impacts on household outcomes. We therefore treat both the number of migrants age 21 and over and remittance receipts as endogenous.

We define the migrant stock as the number of children age 21 and over living outside the parents' barangay. We use an age 21 lower age limit because, in most cases, schooling will already have been completed, and we eliminate the substantial “noise” in the definition of migration status for younger migrants.<sup>17</sup> In turn, remittances  $R$  are a function of the characteristics of the origin household  $X_o$ , shocks experienced by the origin household  $S_o$ , the number of sons and daughters age 21 and over, completed years of schooling of sons and daughters (regardless of location), and shocks experienced by migrants  $S_m$ . We hypothesize that the percentage of migrants in other households does not affect remittance receipts, and that migrant income shocks in a given year affect only remittances, but not the number of migrants from a particular household.

The stock of migrants  $M$  can be expressed as

$$M = \beta_0 + \beta_1 X_o + \beta_2 S_o + \beta_3 N_s + \beta_4 N_d + \beta_5 E_s + \beta_6 E_d + \beta_7 X_v + \varepsilon, \quad (2)$$

where  $X_o$  is a vector of origin household characteristics,  $S_o$  are shocks experienced by the origin household,  $N_s$  and  $N_d$  are the number of sons and daughters age 21 and over, respectively,  $E_s$  and  $E_d$  are completed years of schooling of sons and daughters (regardless of location), respectively,  $X_v$  is a vector of community characteristics that may encourage or deter migration, such as the duration the village has been connected to the main road, the duration the village has had electricity, and the percentage of migrants in other households in the same village, and  $\varepsilon$  is a stochastic error term.

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<sup>17</sup> In undertaking the field work, for example, we found that some students who were classified as migrants in the earlier round (since they lived in nearby cities during the school year) were classified as coresident in the later round, since they had returned for summer vacation.

We posit that remittances consist of permanent and transitory components. The permanent component of remittances is influenced by origin household and migrant network characteristics, while the transitory component is influenced by shocks to origin and migrant households. Because previous studies suggest that remittance behavior in the Philippines is quite different among sons and daughters (Lauby and Stark 1988; Quisumbing 1997), we distinguish between males and females in characterizing the completed years of schooling and shocks experienced by migrants. Remittances  $R$  can thus be expressed as

$$R = \gamma_0 + \gamma_1 X_o + \gamma_2 S_o + \gamma_3 N_s + \gamma_4 N_d + \gamma_5 E_s + \gamma_6 E_d + \gamma_7 X_v + \gamma_8 S_{mm} + \gamma_9 S_{mf} + \omega \quad (3)$$

where  $X_o$  is a vector of parent characteristics, as defined in (1) and (2),  $S_o$  are cumulative shocks experienced by parents,  $N_s$  and  $N_d$  are the number of sons and daughters 21 years and older,  $E_s$  and  $E_d$  are completed years of schooling of sons and daughters 21 years and over,  $X_v$  is a vector of village characteristics (including duration of connection to the main road and electrification, but not the percentage of migrants in other households), and  $S_{mm}$  and  $S_{mf}$  are shocks experienced by male and female migrants, respectively.

We define remittances as the value of remittances received from outside the *barangay* in the past 12 months. Because remittances may respond to origin household characteristics as well as shocks experienced by the origin household, we include the same set of origin household characteristics from (1) in equation (3) as well as the cumulative shocks variable. We use sons and daughters age 21 and over, regardless of location, and completed schooling of those children, rather than of migrants alone, because they are less likely to be tainted by endogeneity bias. If children migrated for schooling—which is common in the Philippines—completed

schooling of migrant children would reflect not only the schooling decision, but also earlier migration decisions.

In creating the migrant shocks variables, we assume that shocks experienced in the current year affect current levels of remittances. Since remittances are defined with reference to the previous 12 months (i.e. 2002 in a survey conducted in 2003), migrant shocks refer to 2002 as well, and provides a snapshot of the shocks experienced by migrants in the previous year, rather than an assessment of the inherent variability of incomes in the destination. Following Yang (2006), who uses exchange rate shocks to identify remittances from migrants to different countries, we use regional GDP shocks in destination regions as one of the identifying instruments for remittances. Thus, migrant shocks are the average of the percentage deviation of destination GDP in 2002 from trend regional GDP in the migrants' destination regions, with averages computed separately for males and females.<sup>18</sup> For international migrants, percentage deviation of national GDP in 2002 from trend national GDP was used.

Because migration and remittances are endogenous to origin household characteristics as well as shocks experienced by the origin households, if migration was influenced by household characteristics, and remittances responded to origin household shocks, it is likely that the error terms in (1), (2), and (3) will be correlated. We use instrumental variables techniques to deal with the endogeneity of migration and remittances in the outcome equation, using the number of sons and daughters age 21 and over, their completed years of schooling, village characteristics affecting migration, and shocks experienced by migrants as excluded instruments.

Our data allow us to examine a wide range of asset and consumption outcomes. Asset outcomes include: values of farm and business equipment, livestock, housing and consumer

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<sup>18</sup> Yang (2006) uses exchange rate shocks to characterize shocks faced by Filipino migrants to international destinations. However, since most of the migrants in our sample are internal migrants, we use the percentage deviation from regional GDP.

durables, and land, in 2003 pesos. Consumption expenditures per adult equivalent are disaggregated into expenditures on food, clothing and footwear, health, education, family events, alcohol and tobacco. Following the discussion of credit constraint status above, we use two indicators of credit constraint status in 2003. The first indicates if the household is quantity- and not risk-constrained, while the second indicates if it is quantity-constrained or risk-constrained. All outcomes are as of the 2003 survey round. Means and standard deviations of variables used in the regressions are presented in Table 5.

### **3.2 Regression Results**

#### *Determinants of migration and remittances.*

Table 6 presents regressions on the probability of having a migrant child, the number of migrant children age 21 and over, the probability of receiving remittances in the past year and the amount of remittances received. Probit estimates are corrected for attrition weights, and standard errors are robust to clustering within barangays.<sup>19</sup>

Life cycle effects are important determinants of the probability of having adult migrant children, though not the number of children who are migrants. The education of the household head has a weak negative impact on the number of adult migrants, indicating that more adult children from poorer households tend to migrate, probably in search of better opportunities. Children with higher educational attainment are more likely to migrate, with daughters' completed schooling having a larger impact than sons' schooling on both the probability of having a migrant child and the number of migrants. Villages that have been connected to the main highway for a longer time tend to have fewer migrants, perhaps because workers can commute to the town center instead of having to relocate, but villages that have had electricity

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<sup>19</sup> Stata does not allow us to correct tobit regressions for attrition weights, but this does not affect our estimates of impact because we use attrition weights in the IV regressions.

for longer durations tend to have more migrants. Finally, the percentage of migrants from other households in the barangay exerts a negative influence on both the probability of migration and the number of migrants. This last result is somewhat counterintuitive because other studies (see, for example, Winters et al. 2000) have shown that potential migrants in communities with larger numbers of migrants are able to take advantage of information networks formed by former migrants. However, in communities where a large number of families are related, and where migration rates are already quite high, there may be diminishing returns to additional migration.

Life cycle effects (age and age squared) are important determinants of the probability of receipt for parent households, but not the amount received. Parental wealth affects neither the probability of receipts nor the amount received. However, remittances appear to perform a consumption-smoothing function. Cumulative shocks up to 2002 increase both the likelihood of receiving remittances and amounts received. Turning now to the characteristics of the potential migrant network, schooling attainment of daughters, but not of sons, increases both the probability of receipt and amounts received. This is consistent with previous studies (Lauby and Stark 1988; Quisumbing 1997) showing that females, particularly better-educated females, are more likely to make remittances to parents. While positive shocks to migrant incomes increase both the probability of receipt and amounts received, the marginal effects of shocks experienced by daughters are larger than those of sons—signifying that if a daughter happens to be “lucky” in terms of income shocks, this is more likely to be reflected in remittances (and larger remittances) than if a sons experienced such a positive income shock. For example, a one percent positive deviation from trend GDP experienced by a migrant son would increase the probability of receiving remittances by 4 percent, but if that positive shock were experienced by a daughter, the probability would increase by 7.5 percent. In terms of remittance receipts, a one percent positive

deviation from GDP in a region where a migrant son was located would increase remittance receipts by 1,420 pesos; if the one percent positive shock occurred in a region where a daughter lived, it would increase remittances by 1,988 pesos.

*Impacts of remittances on assets, consumption, and credit constraint status*

Table 7 presents the coefficient estimates on remittances in both OLS and instrumental variables regressions for the various outcomes. Both migration and remittances are treated as endogenous in the IV regressions. The excluded instruments are presented at the bottom of Table 9. In each IV regression, the F-test on excluded instruments indicates that the instrument set is jointly significant in predicting the endogenous regressor. The Anderson canonical correlation LR statistic indicates that the excluded instruments are relevant (that is, they are highly correlated with the portion of the endogenous regressors that cannot be explained by the other regressors) or the equation is identified. The computed Anderson LR statistics are much higher than the critical values at the 1 percent significance level, rejecting the null hypothesis that the model is under-identified.

However, the performance on the Cragg-Donald F-test for weak instruments is not stellar; the statistic does not exceed the critical value of 4.69, which is associated with a bias relative to OLS of less than 0.30 (Stock and Yogo 2002) for two endogenous regressors and 9 instruments. For all outcomes, the p values for the Hansen J statistic for overidentification do not reject the joint null hypothesis that the instruments are independent of the second-stage disturbance term at the usual 0.05 significance level, and are correctly excluded from the estimated equation. Combined, these diagnostics suggest that our IV estimates, which we prefer to OLS on *a priori* grounds because they attempt to deal with the endogeneity of remittances, generally are fairly satisfactory. Though we ideally would like estimates that performed better

on the weak instrument test, if they suggest different impacts of remittances on a number of outcomes than do OLS estimates, this suggests some reason for being concerned about OLS estimates and how well they represent the true causal impact of migration and remittances on origin household outcomes.

Indeed, our results show that OLS and IV results are quite different, and the differences in signs for the coefficients on migration and remittances indicate that the migration process involves tradeoffs. OLS results indicate weak negative impacts of the number of migrants on housing, the total value of nonland assets, and total asset values (including land) and on total expenditure. Coefficient estimates of the impact of migration on these outcomes are larger in absolute value for the IV estimates, and indicate strong negative impacts on housing and consumer durables, total nonland assets, and expenditure per adult equivalent. In particular, when the endogeneity of migration is taken into account, the number of migrants exerts significant negative impacts on expenditures on clothing and footwear, family events, alcohol and tobacco, and a weak negative impact on health expenditures (all per adult equivalent).

OLS estimates of the impact of remittances, on the other hand, suggest that remittances have a significant positive impact on expenditures per adult equivalent. The expenditure categories that respond positively to remittances are clothing and footwear and educational expenditures. OLS estimates do not indicate any significant impact on asset holdings. Interestingly, when the endogeneity of remittances is taken into account, IV estimates suggest significant positive impacts on housing and consumer durables and the total value of nonland assets and total expenditure per adult equivalent. A thousand pesos received by parents is reflected in increased values of housing and consumer durables in the neighborhood of 5,000 pesos, and total nonland asset values of 12,000 pesos. Similarly, expenditures on clothing and

footwear, education, and alcohol and tobacco increase significantly with remittances. The coefficients themselves indicate that a thousand pesos received by parents tend to be reflected in a 2,200 peso increase in educational expenditures per adult equivalent, a 636 peso increase in clothing and footwear expenditures, and a 255 peso increase in alcohol and tobacco consumption. Clearly, remittances are used to finance educational expenditures of other family members.

While OLS estimates suggest that the number of migrants reduces the probability of being quantity constrained, remittances appear to weakly increase the same probability. However, once both migration and remittances are treated as endogenous, they no longer have any impact on credit constraints in 2003.

These positive impacts on housing, consumer durables, and schooling mirror the findings of Yang (2004). Adopting a reduced form approach, Yang (2004) finds that favorable exchange rate shocks for overseas Filipino migrants lead to greater child schooling, reduced child labor, and increased educational expenditure in origin households. He also finds that favorable exchange rate shocks raise hours worked in self-employment and lead to greater entry into relatively capital-intensive enterprises by migrants' origin households.

Why would remittances not have an impact on current credit constraints? It is possible that we are using an overly-restrictive definition of credit constraints, confined only to agricultural production. It is also possible that credit constraints may be persistent, and may not be affected by short-term fluctuations in remittances, or that we are examining only very short-term impacts. It may also be the case that remittances do not affect credit constraint status directly, but may have differential impacts depending on a household's credit constraint status. Gitter (2006), for example, finds that transfers received through Nicaragua's Red de Proteccion

Social, had a greater positive impact on enrollment of credit constrained households who experienced a drought shock, relative to those that were unconstrained. Yang (2004) finds that positive exchange rate shocks do not have a statistically significant impact on investment outcomes of Filipino households with the highest pre-crisis income levels; presumably, these households are the least likely to be credit constrained. We are unable to test this hypothesis definitively owing to the small sample sizes that result once we divide the sample into credit-constrained and unconstrained households.

#### **4. Concluding Remarks**

Our investigation of the impact of migration and remittances in the rural Philippines does not paint a totally rosy picture. A larger number of migrant children reduces the values of nonland assets, total expenditures per adult equivalent, and some components of household expenditures. On the other hand, remittances have a positive impact on housing and consumer durables, nonland assets, and total expenditures (per adult equivalent). The largest impact of remittances is on the total value of nonland assets (probably driven by increased acquisition of consumer durables) and on educational expenditures. Thus, despite the costs that parents may incur in sending migrants to other communities, the returns, in terms of remittances, play an important role in enabling investment in assets and human capital in sending communities. These effects go beyond consumption-smoothing and have potentially long-term impacts, since they allow origin households to build up their stock of assets and invest in the human capital of the next generation.

Given that migration is likely to continue to be an important livelihood strategy for individuals and households in rural areas of the Philippines, the challenge may be to reduce

barriers to migration as well as reduce transactions costs for migrants sending remittances. In the context of international migration, for example, Yang (2006) has pointed out that reducing the costs of sending remittances is effectively an improvement in the exchange rate faced by remittance senders. Reducing barriers to migration and creating employment opportunities for migrants in destination regions may stimulate investment in human capital, acquisition of assets, and entrepreneurship in sending regions.

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**Table 1. Distribution of children age 15 and over of original respondents, by location, 2003**

Location	Males		Females		Total	Percent distribution
	Number	Percent	Number	Percent		
<i>Nonmigrants</i>	<u>510</u>	<u>61.8</u>	<u>330</u>	<u>43.5</u>	<u>840</u>	<u>53.1</u>
Coresident with parents	368	44.6	189	24.9	557	35.2
Same <i>barangay</i> as parents	142	17.2	141	18.6	283	17.9
<i>Rural migrants</i>	<u>115</u>	<u>13.9</u>	<u>127</u>	<u>16.8</u>	<u>242</u>	<u>15.3</u>
Different <i>barangay</i> , rural	81	9.8	95	12.5	176	11.1
Rural Mindanao outside Bukidnon	27	3.3	20	2.6	47	3
Rural Philippines outside Mindanao	7	0.8	12	1.6	19	1.2
<i>Peri-Urban migrants</i>	<u>41</u>	<u>5.0</u>	<u>66</u>	<u>8.7</u>	<u>107</u>	<u>6.8</u>
Different <i>barangay</i> , <i>poblacion</i>	37	4.5	59	7.8	96	6.1
Peri-Urban, outside Bukidnon	4	0.5	7	0.9	11	0.7
<i>Urban migrants</i>	<u>156</u>	<u>18.9</u>	<u>209</u>	<u>27.6</u>	<u>365</u>	<u>23.1</u>
Urban Bukidnon	24	2.9	31	4.1	55	3.5
Cagayan de Oro	51	6.2	59	7.8	110	6.9
Other Urban Mindanao	21	2.5	35	4.6	56	3.5
Urban Philippines outside Mindanao	60	7.3	84	11.1	144	9.1
Abroad	3	0.4	26	3.4	29	1.8
Total	825	100	758	100	1583	100

Source: Bukidnon Panel Survey, 2003 round

**Table 2. Characteristics of parent households and migrant networks, 2003**

<b>Characteristics of origin households</b>	<b>Parents who were reinterviewed in 2003</b>	
	<b>Mean</b>	<b>Standard deviation</b>
Age of household head	54.72	7.65
Education of household head	5.80	3.12
Males 15 years and older	2.42	1.31
Females 15 years and older	1.81	0.97
Household members less than 15 years	1.47	1.44
Number of sons 21 years and older	2.27	1.63
Number of daughters 21 years and older	2.09	1.69
<i>Characteristics of migrant networks</i>		
Whether parent has any migrant child 21 and over	0.80	0.40
Whether parent has any migrant son 21 and over	0.59	0.49
Whether parent has any migrant daughter 21 and over	0.73	0.44
All migrant children 21 and over	2.17	1.82
Number of migrant sons 21 and over	0.91	1.08
Number of migrant daughters 21 and over	1.26	1.26
Completed schooling of sons 21 and over	7.29	4.26
Completed schooling of daughters 21 and over	7.89	4.90
Whether parent received remittances from outside <i>barangay</i> in past year	0.62	0.49
Total receipts from outside <i>barangay</i> in past year (pesos)	11754.49	37396.76

Note: n=295

**Table 3. Receipts of transfers by parent households, by location of children**

Location of children	Transfers received by parents				p-value of difference	Remittances sent by children, by location of children			
	Parents without children in each location		Parents with children in each location			Number of transfers	Mean	Median	Percent sending more than 500 pesos
	Number of transfers <sup>a</sup>	Value of receipts in 2002	Number of transfers	Value of receipts in 2002					
Living at home	52	11,837	259	12568	0.90	n.a. <sup>b</sup>	n.a.	n.a.	n.a.
Living in same <i>barangay</i>	164	12,261	147	12,635	0.93	205	417	0	14
Living in other rural area	150	13,767	161	11,216	0.55	117	1425	150	26
Living in <i>poblacion</i> (municipality seat)	226	11,966	85	13,724	0.71	73	1476	200	41
Living in urban area	117	9,019	194	14,513	0.21	94	3258	615	54
Total	n.a.	n.a.	846	12,885	n.a.	489	1362	100	29

n.a.=not applicable.

<sup>a</sup>There are no parents who do not have children in any location, so totals are not applicable.

<sup>b</sup>Remittances are defined as transfers from outside the village where parents live, so transfers received from children living at home are not counted. .

**Table 4: Distribution of households, by credit constraint status, by type of constraint**

	Original 1984/85		Original 2003		Split 2003	
	Mean	SD	Mean	SD	Mean	SD
Credit constrained if desired more credit	0.36 a	0.48	0.33	0.47	0.32	0.47
Wants more credit, or avoiding default risk (definition 1)	0.59 b	0.49	0.75	0.43	0.74	0.44
Wants more credit, or avoiding default risk (definition 2)	0.60 b	0.49	0.39	0.49	0.36	0.48

Notes: Agricultural producers only

Definition 1: does not want to avail of more credit because afraid cannot pay back

Definition 2: does not want to avail of more credit because of fear of losing collateral, too much debt, and not used to borrowing

a. Computed for rounds 2-4

b. Computed for rounds 3-4 only

**Table 5: Means and standard deviations of variables in regressions**

	<b>Parents who were re-interviewed in 2003</b>	
	<b>Mean</b>	<b>Standard Deviation</b>
<i>Number of migrants age 21 years and older</i>		
Probability of having a migrant child 21 years and over	0.80	0.40
Number of migrant children 21 years and over (endogenous regressor)	2.17	1.82
<i>Remittances (past 12 months, 2003)</i>		
Probability of receiving remittances	0.62	0.49
Total remittances received in '000 pesos (endogenous regressor)	11.75	37.40
<i>Assets (value in '000 pesos in 2003)</i>		
Productive assets	33.37	447.14
Livestock assets	13.72	19.01
Other assets	188.29	374.71
Total nonland assets	648.86	1516.45
Value of land owned	413.47	1074.91
Value of land and assets	1062.33	2532.84
<i>Weekly expenditures per adult equivalent (pesos in 2003)</i>		
Total expenditures	650.57	737.09
Food	287.69	156.04
Clothing and footwear	26.37	32.33
Health	32.59	105.37
Education	56.43	118.53
Family events	52.95	184.23
Alcohol and tobacco	5.93	23.53
<i>Credit constraint status in 2003</i>		
Quantity constrained	0.33	0.47
Quantity or risk constrained	0.74	0.44
<i>Household characteristics in 2003</i>		
Age of household head	54.72	7.65
Age squared	3053.68	856.92
Education of household head (years)	5.80	3.12
Males older than 15 years	2.42	1.31
Females older than 15 years	1.81	0.97
Household members 15 years and younger	1.47	1.44
Distance to town center (poblacion)	5.44	3.62
<i>Initial assets</i>		
Ln net worth in round 1 of 1984/85	1.97	1.62
Area cultivated per capita, round 1, 1984/85	3.23	4.11
<i>Instruments</i>		
Number of sons 21 years and older	2.27	1.63
Number of daughters 21 years and older	2.09	1.69

(continued)

	<b>Parents who were re-interviewed in 2003</b>	
	<b>Mean</b>	<b>Standard Deviation</b>
Years village has been connected to main road to town	36.73	15.10
Years village has had electricity	20.28	5.86
Completed schooling of sons 21 and over	7.29	4.26
Completed schooling of daughters 21 and over	7.89	4.90
Average percentage deviation of GPD from trend, migrant sons	1.96	1.90
Average percentage deviation of GPD from trend, migrant daughters	2.54	2.11
Percent of migrants from other households in village	59.84	13.48

**Table 6: Determinants of the probability of having a migrant child, total number of migrants, the probability of receiving remittances and total remittances received**

	Parents who were reinterviewed in 2003							
	Probability of having a migrant child over 21 Probit		Number of migrant children over 21 Tobit		Probability of receiving remittances Probit		Total remittances received Tobit	
	dF/dx	z	dy/dx	z	dF/dx	z	dy/dx	z
Age of household head in 2003	0.057	<b>2.05</b>	0.190	1.57	-0.094	<b>-2.00</b>	-1.407	-0.77
Age squared	0.000	<b>-1.68</b>	-0.001	-0.79	0.001	<b>2.02</b>	0.011	0.69
Education of household head	-0.001	-0.19	-0.054	<b>-1.68</b>	0.005	0.43	0.556	1.14
Ln net worth in 1984/85	-0.009	-0.53	-0.105	-1.32	-0.032	-1.22	-0.418	-0.35
Area cultivated in 1984/85	-0.004	-0.68	0.016	0.53	-0.003	-0.31	0.386	0.86
Distance to town center	0.001	0.22	0.020	0.69	-0.009	-1.02	-0.693	<b>-1.66</b>
Cumulative shocks, 1984-2002	0.018	1.10	0.085	1.13	0.090	<b>3.44</b>	1.997	<b>1.74</b>
Number of sons 21 and older	0.006	0.44	-0.018	-0.32	-0.013	-0.69	-1.317	-1.57
Number of daughters 21 and older	-0.010	-0.92	0.048	0.89	-0.014	-0.78	-0.030	-0.04
Mean education of sons 21 and older	0.013	<b>2.45</b>	0.077	<b>3.06</b>	0.011	1.26	0.647	1.60
Mean education of daughters 21 and older	0.021	<b>4.65</b>	0.111	<b>5.39</b>	0.013	<b>1.80</b>	0.807	<b>2.45</b>
Duration of road connecting village to town	-0.004	<b>-2.08</b>	-0.013	<b>-1.87</b>	0.006	<b>2.36</b>	0.327	<b>2.87</b>
Duration village was electrified	0.009	<b>2.18</b>	0.046	<b>2.51</b>	-0.023	<b>-3.50</b>	-1.088	<b>-3.80</b>
Percentage of migrants from other households in village	-0.004	<b>-2.68</b>	-0.029	<b>-3.86</b>				
Percent deviation from trend GDP in 2002, male migrants					0.042	<b>2.13</b>	1.420	<b>1.88</b>
Percent deviation from trend GDP in 2002, female migrants					0.075	<b>4.04</b>	1.988	<b>2.91</b>
Observed probability	0.80				0.61			
Predicted probability	0.88				0.64			
Left censored observations			59				111	
Uncensored observations			236				184	
Number of obs	295		295		295		295	
LR chi2(18)	<b>70.24</b>		155.81		53.24		55.69	
Prob > chi2	0.00		<b>0.00</b>		<b>0.00</b>		<b>0.00</b>	
Pseudo R2	0.31		0.13		0.17		0.01	

Notes: z-values in bold are significant at 10% or better

Probit z values computed using robust standard errors

**Table 7: Impact of migration and remittances on asset holdings, consumption expenditures, and credit constraint status of parent households, ordinary least squares and instrumental variables estimates**

Outcome	Migration and remittances (endogenous regressors)									
	Coefficient on number of migrants					Coefficient on remittances				
	OLS		IV		OLS		IV		Overid test Hansen	
	Coeff	t	Coeff	z	Coeff	t	Coeff	z	J	p-value
<i>Assets in 2003</i>										
Farm and business equipment	15.718	0.76	-0.219	-0.01	-0.411	-0.68	2.158	1.43	2.94	0.89
Livestock	-0.920	-1.44	-0.865	-0.80	-0.005	-0.22	0.127	1.40	10.04	0.19
Housing and consumer durables	-19.424	<b>-1.71</b>	-46.555	<b>-2.01</b>	0.184	0.43	5.127	<b>2.14</b>	6.00	0.54
Total nonland assets	-66.588	<b>-1.73</b>	-184.311	<b>-1.67</b>	-1.272	-1.02	12.677	<b>1.81</b>	5.80	0.56
Value of land	-61.961	<b>-1.87</b>	-136.673	-1.52	-1.041	-1.02	5.266	1.17	6.826	0.45
Value of land and assets	-128.548	<b>-1.96</b>	-320.984	-1.62	-2.312	-1.11	17.943	1.59	6.39	0.50
<i>Expenditures per adult equivalent in 2003</i>										
Total expenditure	-60.201	<b>-1.60</b>	-136.786	<b>-2.74</b>	2.655	<b>2.48</b>	8.855	<b>1.97</b>	3.50	0.83
Food	-1.810	-0.29	-21.113	-1.53	0.164	0.67	1.136	1.27	9.75	0.20
Clothing and footwear	-1.841	-1.38	-5.366	<b>-1.97</b>	0.321	<b>2.78</b>	0.636	<b>3.06</b>	3.94	0.79
Health	-2.512	-0.86	-13.058	<b>-1.79</b>	-0.017	-0.16	0.625	1.44	3.29	0.86
Education	-5.587	-1.01	-13.636	-1.16	1.047	<b>2.76</b>	2.276	<b>2.60</b>	6.72	0.46
Family events	-5.111	-1.13	-23.821	<b>-2.10</b>	-0.076	-0.39	1.313	1.53	5.85	0.56
Alcohol and tobacco	-0.654	-0.72	-4.467	<b>-3.37</b>	0.061	1.60	0.255	<b>2.11</b>	4.85	0.68
Partial R-2 of excluded instruments			0.243				0.0647			
F-test of excluded instruments			20.31				2.200			
p-value			<b>0.00</b>				<b>0.05</b>			
Cragg-Donald weak identification statistic			2.090							
Anderson canonical correlation LR statistic			19.56							
p-value			<b>0.01</b>							
<i>Credit constraint status in 2003</i>										
Quantity constrained	-0.037	<b>-2.23</b>	-0.047	-1.15	0.001	<b>1.89</b>	0.000	0.14	9.00	0.25
Quantity or risk constrained	-0.020	-1.00	0.002	0.05	0.001	1.46	-0.001	-0.47	6.28	0.51

(continued)

Outcome	Migration and remittances (endogenous regressors)									
	Coefficient on number of migrants					Coefficient on remittances				
	OLS		IV		OLS		IV		Overid test Hansen	
	Coeff	t	Coeff	z	Coeff	t	Coeff	z	J	p-value
Partial R-2 of excluded instruments			0.25				0.10			
F-test of excluded instruments			10.49				2.16			
p-value			<b>0.00</b>				0.06			
Cragg-Donald weak identification statistic			2.29							
Anderson canonical correlation LR statistic			21.64							
p-value			<b>0.01</b>							

Notes: Regressions estimated with attrition weights; standard errors are robust to clustering within villages

z-values and p-values in bold indicate significance at 10% or better

Parent regressions:

Regressors in outcome equation: age of household head, age squared, education of household head, in net worth in round 1 of 1984/85, area cultivated in round 1, 1984, distance to town center, males older than 15 in household, females older than 15 in household, household members 15 and younger, cumulative shocks up to 2002.

Instruments: Sons 21 years and older, daughters 21 years and older, duration village connected to main road, duration village was electrified, average completed years of schooling of sons and daughters 21 and over, percent GDP deviation of migrant sons, percent GDP deviation of migrant daughters, proportion of migrants from other households in village

**Table A1: Means and standard deviations of variables used in the attrition analysis**

<b>Variables</b>	<b>Mean</b>	<b>Standard deviation</b>
<i>Dependent variable</i>		
Whether reinterviewed in 2003	0.61	0.49
<i>Regressors</i>		
<i>Household-level variables</i>		
Age of the household head in 1984	35.68	8.38
Age of the household head squared	1342.81	631.84
Whether head completed secondary schooling (10 years or more)	0.13	0.33
Percentage of household members over 14 with 6 or more years of schooling in 1984	0.59	0.37
Log of household size in 1984	1.81	0.37
Dependency ratio in 1984	1.55	0.81
Share of female working members in 1984	0.48	0.10
<i>Asset quartile in 1984, highest excluded</i>		
Lowest asset quartile	0.25	0.43
Second asset quartile	0.25	0.43
Third asset quartile	0.25	0.43
Whether sugar producer in 1984	0.21	0.41
Whether agricultural producer in 1984 (a)	0.77	0.42
Whether household had a nonagricultural business in 1984	0.24	0.43
Head is Catholic, 1984	0.92	0.27
Distance to <i>poblacion</i> (town center), in km	5.18	3.56
<i>Barangay-level variables</i>		
Origin heterogeneity	0.55	0.15
Ethnic heterogeneity	0.48	0.19
Asset heterogeneity	1.62	0.45
Education heterogeneity	0.36	0.08
Percentage of households by affected peace and order problems since 1984	18.87	52.97
<i>Programs operating in barangay, 2000-2001</i>		
Cooperatives	0.35	0.51
Nongovernmental organizations	0.19	0.49
Government organizations	0.40	0.72
<i>Barangay</i> mean of total value of nonland assets in 1984	62.66	61.50
<i>Barangay</i> nonattrition rate, rounds 1-4, household excluded	0.88	0.09
<i>Barangay</i> household growth rate between 1980 and 2000	0.74	0.42

Notes: Number of observations=510

(a) Defined as having a farm size greater than 0.1 hectare

**Table A2: Determinants of the probability of being reinterviewed in 2003**  
**Probit regression with robust standart errors; marginal effects reported**

Variables	dy/dx	z
Age of the household head in 1984	-0.246	<b>-2.60</b>
Age of the household head squared	-0.074	-0.82
Whether head completed secondary schooling (10 years or more)	-0.011	-0.15
Percent household members with 6 or more years of schooling in 1984	0.029	0.32
Log of household size in 1984	0.060	0.71
Dependency ratio in 1984	0.162	0.78
<i>Asset quartile in 1984, highest excluded</i>		
Lowest asset quartile	-0.113	-0.85
Second asset quartile	0.066	1.27
Third asset quartile	-0.026	-0.08
Whether sugar producer in 1984	0.030	1.21
Whether agricultural producer in 1984 (a)	0.000	-1.22
Whether household had a nonagricultural business in 1984	0.107	1.61
Head is Catholic, 1984	-0.042	-1.41
Distance to <i>poblacion</i> (town center), in km	-0.105	-1.38
<i>Barangay-level variables</i>		
Origin heterogeneity	0.111	1.45
Ethnic heterogeneity	-0.007	-0.13
Asset heterogeneity	-0.043	-0.59
Education heterogeneity	0.009	1.14
Percentage of households affected by peace/order problems since 1984	-0.001	<b>-2.29</b>
<i>Programs operating in barangay, 2000-2001</i>		
Cooperatives	0.008	0.17
Nongovernmental organizations	0.021	0.47
Government organizations	0.013	0.36
<i>Barangay</i> mean of total value of nonland assets in 1984	0.000	0.65
<i>Factors determining attrition</i>		
Share of female working members in 1984	0.680	<b>3.65</b>
Proportion of non-attritors in the <i>barangay</i> , rounds 1-4 in 1984	0.792	<b>2.82</b>
<i>Barangay</i> household growth rate between 1980 and 2000	0.065	1.11
Joint test that coefficients of factors determining attrition=0		
Chi-square (p-value)	24.100	<b>0.00</b>
Number of obs	509	
Wald chi2(26)	486.99	
Prob > chi2	0.00	
Pseudo R2	0.10	

Notes: Standard errors are robust to clustering within *barangays*  
z-values in bold are significant at 10% or better

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