

**THE *LONG-RUN* EFFECTS OF ACCESS TO FINANCIAL SERVICES ON
ASSET ACCUMULATION, ECONOMIC MOBILITY, AND THE EVOLUTION
OF WELL-BEING: REVISITING AGRICULTURAL COMMERCIALIZATION
IN BUKIDNON, 1984-2003**

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ABSTRACT

The research program aims to understand how access to rural financial services affects patterns of physical and human capital accumulation, economic mobility, and well-being over a long period of time, and to assess how these patterns differ between commercialized and food crop oriented agriculture. The research will involve resurveying original respondents and their children from a sample of agricultural households in the Mindanao region of the Philippines previously surveyed by the same collaborating institutions in 1984 and 1992. Using a quasi-experimental design, the study will identify the differential effects of credit constraints on households exposed to commercial agriculture and those relying on food crop production. The study involves a qualitative study in all survey communities, focusing on changes that have taken place since 1984, the growth and relative importance of financial institutions, and perceptions of poverty and changes in wellbeing over time. The qualitative study will be followed by a quantitative household survey which will collect detailed information on access to and use of financial services, consumption, production, assets, and indicators of well-being. The research program includes training and capacity building activities for host-country collaborators as well as a series of policy seminars for host-country policymakers.

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A. PROPOSAL NARRATIVE

1. Introduction

What role do financial markets play in the evolution of people's well-being over time in a poor agrarian economy? It is well known that rural economies in developing countries are subject to market failures. Imperfections in credit markets, in particular, have a number of serious consequences for production and consumption in the short run, and for asset accumulation, poverty reduction, and the evolution of well-being in the long-run. For example, credit constraints could obviate the supervision cost advantage of small farmers (Kevane 1996), lead them to adopt costly and less efficient insurance substitutes, such as low return-low risk crop and asset portfolios (Rosenzweig and Binswanger 1993), and result in an inability to smooth consumption in the face of income shocks. As a result, credit-constrained farmers may hold a portfolio of less risky but less productive assets, affecting their productive performance and income paths over time. Credit constraints do not limit investments in physical capital alone: if parents cannot borrow to finance their children's health and education, they may not be able to invest optimally in their children's human capital, with consequences for the well-being of future generations (Becker and Tomes 1986; Behrman, Pollak, and Taubman 1992; Foster 1995). Credit constraints may also result in behavioral adaptations such as fragmentation of fields, migration of and remittances by family members, gift-giving, and patron-client relationships that are often characterized as being part of "peasant rationality" (Deininger 2001, citing Townsend 1995; Rosenzweig and Stark 1989; Fafchamps 1992).

Because multiple market failures are likely in developing countries, it is almost impossible to focus on imperfections in one market without paying attention to its interlinkages with others. In part due to the prevalence of multiple market failures, the welfare implications of credit constraints for poor farmers are deeply interlinked with the structure of agricultural production, and particularly with the degree of commercialization. The production of crops primarily for sale rather than for subsistence generally leads to greater use of marketed inputs and can also affect the distribution of land if the optimal farm size differs between the cash and subsistence crops. In addition, many cash crops are subject to

greater production risk than basic food crops. Indeed, the decision to grow semi-subsistence food crops may reflect greater risk aversion, particularly for the poor. These factors affect the sources of demand for credit between the two types of farming. Commercialized farmers are likely to have greater demand for credit to finance crop production than semi-subsistence food crop farmers. Whether commercialized farmers also have greater demand for credit as a form of insurance and consumption smoothing depends on the relative riskiness of the cash crop. As a result, the presence of credit constraints will have different implications for asset accumulation and welfare for cash crop and food crop farmers. The differences in production environment also affect default risks and loan sizes, so that the probability of being credit constrained differs by degree of commercialization as well. Moreover, the development of rural financial institutions such as group-lending programs and rotating savings and credit associations (ROSCAs) will reflect the differences in sources of credit demand in regions dominated by commercialized versus subsistence farming.

Most empirical studies of credit market constraints have focused on outcomes in the short to medium term.¹ However, there is scant evidence on the long run effects of credit constraints. For example, Zeller and Sharma (1998) were unable to find any short-run impact of access to financial services on nutrition, perhaps due to an insufficiently long timeline for measuring credit access.² Similarly, while economic models have simulated the impact of credit market imperfections on long-term accumulation and the resulting structure of production (e.g. Carter and Zimmerman 2000), empirical studies of long-term economic mobility are limited, in large part due to the absence of longitudinal data linking past credit market imperfections to current outcomes.

The proposed research program provides a rare opportunity to study the long run impact of credit constraints on human and physical asset portfolios, economic mobility, and well-being by resurveying original respondents and their children from a sample of agricultural households in the Mindanao region of the Philippines previously surveyed by the same collaborating institutions in 1984 and 1992. In the 1984/85 and 1992 surveys the same core group of 448 households was surveyed by the International Food Policy Research Institute and the Research Institute for Mindanao Culture, Xavier University. Detailed

economic and nutrition information was collected for individual household members (e.g. earnings from various employment activities, anthropometry, education, food intakes; see Bouis and Haddad 1990 and Bouis et al. 1998 for details) and at the household level (e.g. farm production, production and consumption credit, housing, total expenditures). The research site was selected to study the effects of agricultural commercialization on consumption and nutrition outcomes. Construction of a sugar mill in the area in 1977 led to a major shift from corn production to sugar production for many households in the region. A revisit to the site in 1999 and a random sampling of previously surveyed households indicates that a very high percentage of households and individuals can be found for resurvey, including households formed from marriages of the children in the respondent households who have reached adulthood since the original surveys were undertaken.

This site also provides a particularly policy-relevant case study of possible avenues for asset accumulation under credit constraints under different crop production regimes and land tenure distributions. The original case study (Bouis and Haddad 1990) examined the effects of the shift from subsistence corn production to sugarcane after the construction of a sugar mill. The main effects of the introduction of export cropping were a significant deterioration in access to land, as smallholder corn tenant farms using primarily family labor were consolidated into larger sugar farms using primarily hired labor; an increase in incomes for households that grew sugarcane; a decline in women's participation in own-farm production; and very little improvement in nutritional status as a result of increased incomes from sugarcane production, primarily because of the high levels of preschooler sickness in the sugarcane-growing households. The issue of deteriorating land access in the face of increased commercialization is an especially important one in Mindanao, the Philippines' poorest region, which has a long history of armed conflict. Policymakers have recognized the need both to reduce poverty in Mindanao and to improve financial services in this area (Medium Term Philippine Development Plan 2002-2004); one of USAID's programs in Mindanao involves working with rural banks and credit cooperatives to assist them to profitably serve the microenterprise market (USAID 2001).

2. Objectives of the Research Program

The overall goal of the research program is to understand how access to rural financial services affects patterns of physical and human capital accumulation, economic mobility, and well-being over a long period of time, and to assess how these patterns differ between commercialized and food crop oriented agriculture.

2.1 General Statement of Research Objectives

The proposed research program aims to:

- a. Characterize the evolution of rural financial markets in the rural Philippines, based on both the demand (farmer) side and supply side (formal and informal financial institutions), accounting for differences in markets arising from introduction of commercialized farming;
- b. Characterize the nature of credit constraints faced by rural households;
- c. Understand the mechanisms which households of different asset classes and commercial orientation have used to cope with credit constraints;
- d. Analyze how credit constraints have affected patterns of physical asset accumulation, investment in children's human capital, and economic mobility.

While recent studies have focused on growth of both formal and semiformal financial institutions in the Philippines (e.g. Getubig, Johari, and Thas (1993)), studies that attempt to connect the demand side with the supply side are generally lacking. This connection is important because building a lasting and sustainable rural financial sector hinges on knowing and providing financial products and services that are of value to rural clients.³

2.2 Specific Research Issues

As part of this research agenda, we expect to address, among others, the following specific research questions about rural financial markets and their effects on sugar and corn growers in Bukidnon:

- a. Did households that were unconstrained in credit access in 1984 have higher well-being (measured by per capita consumption) in 2002? Were they less likely to be credit

constrained in 2002? Were their children less likely to be credit constrained than the children of previously constrained parents?

- b. Did commercialized sugar farmers, who had higher average incomes than corn farmers in 1984, maintain this advantage in living standards in 2002? To what extent does credit access explain the observed differences in performance?
- c. How has the formal financial sector evolved in Bukidnon? To what extent are services of formal institutions (commercial as well as development banks) accessible to poor farming households? To what extent are financial products provided by these institutions aligned to demand patterns arising either out of commercial agricultural production or production for subsistence?
- d. How is the development of informal financial institutions such as group lending schemes and ROSCAs, which have grown considerably in the recent past, affected by differential credit access for sugar and corn farmers? How have these informal institutions evolved in terms of their institutional structures and the financial products they provide, and what relevant lessons can be drawn for formal sector operators? Also, do production loans from the mill operators crowd out informal financial institutions in regions concentrated on sugar production?

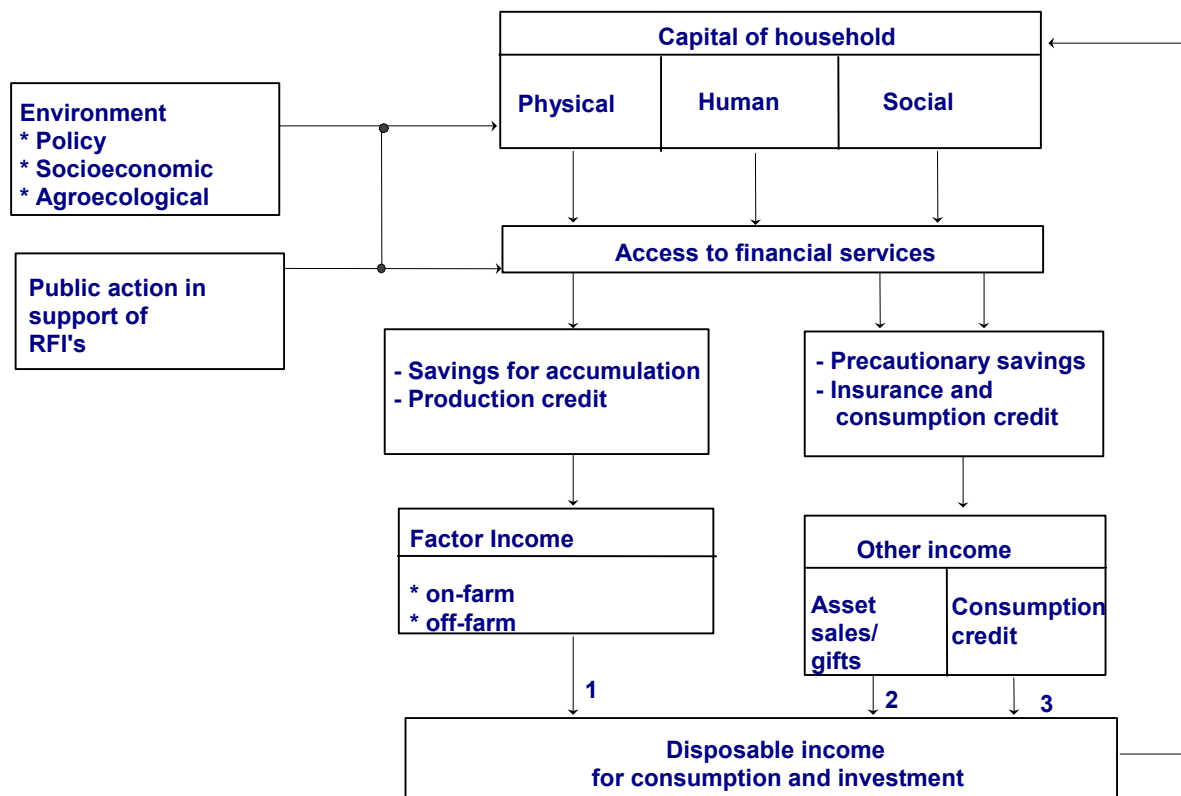
3. Conceptual Framework

The linkages between access to financial services and household welfare are presented in Figure 1 (Zeller et al 1997). Three pathways are conceptualized through which access to and participation in financial markets is expected to affect household welfare:

- Pathway I: via income generation
- Pathway II: via asset investment strategies to smooth disposable income over time
- Pathway III: via the use of credit to finance immediate consumption needs

In Pathway I, an improvement in access to capital in the form of credit, savings or insurance services can be used to finance factor purchases and enhance the level of the household's human and physical capital.

Figure 1— How Does Access to Financial Markets Influence Household Well-Being?



In addition, access to capital increases the risk-bearing capacity of the household, enabling the adoption of riskier but more profitable income-generating activities in lieu of traditional risk-coping strategies such as crop diversification and field fragmentation. In Pathway II, improved access to credit and savings leads to a decrease in the holding of assets with low risk-adjusted returns, a decline in assets held for precautionary savings, and an increase in assets held for speculative purposes. In Pathway III, access to capital and savings institutions enables smoothing of consumption over time in response to transitory shocks to income.

The model developed under this research will show how access to financial markets affects household decisions in production, consumption and investment in physical and human capital. It further demonstrates how these decisions in turn affect outcomes including agricultural productivity, farmers’

choice of economic activity, and the human capital achievement of their children. At each stage, the analysis accounts for differences in the effects of access to credit markets and savings schemes on farms growing cash or food crops. This model is related to the class of models that consider the effects of market failure on the structure of production and investment decisions including Feder (1985), Eswaran and Kotwal (1986) and Carter and Zimmerman (2000).

In this model household welfare is a function of the net present value of lifetime income, where income is earned from agricultural production, off-farm employment, investment in financial assets, and transfers from adult children. These production and investment decisions are potentially constrained by (i) an ex ante working capital constraint and (ii) a household time constraint. The working capital constraint requires that farm expenditures on paid labor and (net) land rentals cannot exceed working capital, which includes savings, credit, and off-farm labor income. As in Carter and Zimmerman (2000), we assume that because land is used as collateral, credit use is linearly related to land holdings, although it can be obtained at an exogenous interest rate. In order to relieve constraints to working capital, households can adjust to imperfect access to credit markets by increasing savings. Also, as is typical in this type of model, hired labor exhibits moral hazard so that household time is required to supervise employees.

The two main extensions to this type of model of agrarian structure are (i) the choice between cultivating a cash (sugar) or food (corn) crop for an exogenously selected subset of farmers,⁴ and (ii) investment in the human capital (health and education) of children. The process of agricultural commercialization in this context can be characterized as gaining affordable access to processing facilities for the cash crop and obtaining marketing services linked to processing.⁵ The effect of these changes is to reduce production costs of the cash crop and to relieve the working capital constraint through production credit provided directly from the mill or through lower interest rates, which represent the reduced risk premium for lenders to commercialized farmers. These changes result in higher credit and input use for commercialized farmers. Because returns to capital are greater for cash crop farmers, relaxing credit constraints has a larger marginal effect on agricultural production for cash-crop farmers and a larger

marginal effect on investment in the human capital of children (an indirect form of consumption smoothing) for food-crop farmers. Of course, average investments in human capital of children may be higher for cash-crop farmers whose incomes are higher. These results can explain the differences in sources of demand for credit for sugar and corn farmers in the Philippines.

4. Research Methodology

4.1 Data Collection

Qualitative Methods. Due to the long time interval between the proposed study and the original study, it is expected that many changes will have taken place in the study communities.⁶ Although there was a preliminary survey conducted in 1999, qualitative data/information is imperative to determine further changes that have taken place in the area. Several qualitative methods will be employed. A rapid assessment/appraisal procedure (RAP) will initially be undertaken in the study areas to assess local conditions and needs, knowledge, attitudes and behaviors of the community. Data collection, which will entail the use of Focus Group Discussion (FGD) and Key Informant Interviews, is expected to last between four to six weeks.

FGD is an interview context where a small group of participants (7-10) is guided by a moderator to talk freely and spontaneously on an issue considered important to the research. The participants will be chosen from a larger target group sharing similar ideas and opinions. Target groups will include: farmers, tenants, landowners/planters, landless farmers, farm laborers, women, indigenous communities and entrepreneurs/traders of Southern Bukidnon.

Key informant interviews will be used to cull information from individuals about their knowledge, attitudes and motivations on the issues concerned. These key informants include the Governor; mayors of the municipalities and Barangay Captains of the area of study; municipal officers of concerned government agencies such as the Department of Agrarian Reform, Department of Environment and Natural Resources, Department of Agriculture, Department of Trade and Industry, Department of

Health, NGO groups, people's organizations, traders' associations, cooperative associations and tribal chieftains.

The qualitative study would focus on respondents' perceptions of changes that have occurred in the communities over time, including the development and relative importance of different types of financial institutions, perceptions of poverty, perceptions of strategies used by households and individuals to improve their well-being over time. The qualitative study will play an important role in establishing a timeline for the development and spread of village financial markets from the time of the last survey in 1992 until the present. Once this is done, questions about household interactions with/participation in these institutions can be appropriately framed in the household questionnaire.

Quantitative Methods. The proposed research will use quasi-experimental longitudinal cohort methods to collect data in 2002-03 from (1) households previously surveyed in 1984/85 and 1992, and (2) households formed since 1984/85 of children in respondent households who have now married and who reside either in the village or nearby municipalities. Due to budget limitations, we will no longer interview children who have migrated, but will obtain information on them from the original respondents so they can be followed-up in future studies.⁷

Sampling of the original households in 1984/85 was conducted according to a quasi-experimental design in order to compare households which had shifted into sugarcane production and those which had not. In order to obtain roughly comparable adopting and nonadopting groups, the survey area was extended beyond the vicinity of the sugar mill to include households that did not have the opportunity to adopt sugar (due to prohibitive costs of transporting sugarcane to the mill) but shared a common growing environment and cultural heritage with sugarcane adopting households. For the detailed production surveys, 17 households were chosen from each of 30 barrios to give a total sample of 510 households. Three categorical lists for the 30 barrios were drawn up: (1) barrios close to the mill (sugar production common); (2) barrios at an intermediate distance (sugar production sparse); and (3) barrios far away from the mill (sugar production nonexistent or rare). Ten barrios were selected from each list at random (with probability proportional to the number of households in each barrio), a short questionnaire was

administered to 68 households selected at random, and a longer questionnaire was eventually administered to the 17 households in each barrio who were chosen from landowner, tenant, and landless laborer households from the sugar and corn groups.

All original households from the 1984/85 study (510 households were interviewed in the first round; 448 households were surveyed in all four rounds, at four month intervals) will be included in the proposed study sample. We are confident that we will be able to locate the vast majority of the original households and many of the households created by their children. Our optimism derives from fieldwork at the study site in March 1999, in which a team of researchers from IFPRI and Xavier University attempted to locate 20 percent of the original respondent households as a trial for a proposed resurvey. Table 1 provides a summary of this attempt to locate a subsample of the original respondents. Out of the 124 households sought, 102 (82%) were found living in the same house as in 1984/85, 5 had moved to a neighboring barrio, and 5 more had moved to another barrio elsewhere in Bukidnon. The team was confident that these latter 10 households could also be located and interviewed, raising the share of 1984/85 respondents that could be included in a new survey round at that time to 90%. Although attrition could be worse in other parts of the sample and additional households may be lost by 2003, an attrition rate of only 10% in 15 years for this subsample suggests that a resurvey in 2003 is certainly feasible. Nonetheless, we will test for attrition bias during estimation and will attempt to address any bias through a selection model, as discussed below.

Table 1— Current residence of Household Head by Barrio

	Current residence						Total
	No Data	Same House	New Barrio, Same Municipality	Elsewhere in Bukidnon	Cacagayan de Oro / Davao	Elsewhere	
Ceboli		20	2				22
Merangeran		12	2	2		1	17
Kauyonan	2	20		1		1	24
Kianggat		15		2	1	2	20
Natulongan		16	1		1	2	20
Talahiron	2	19					21
Total	4	102	5	5	2	6	124

The quantitative component of the study will be based on a one-round household survey that will cover income, expenditure, financial transactions, household resource access and allocation, demographic changes, education, health, nutrition, food consumption, and access to community resources.

The proposed study will also investigate the effect of credit and savings constraints on outcomes for the next generation through underinvestment in the human capital of children, reduced intergenerational transfers, and failures of market access due to transmitted information asymmetries and limited social capital. The proposed survey will collect data on offspring of original respondents in two ways. First, we will find and interview all of the households formed by the children of the original respondents that are residing in or near the original barrio of their parents. A separate survey instrument will be designed for this purpose. Interviews in 1999 with respondents residing in their original barrios identified 166 households formed by their married children. Forty-six percent of those households resided in the same house or barrio as their parents and another 23 percent lived in the same municipality. Of course, the sample of children that lives near their parents could have systematically different economic outcomes and use of financial services than their siblings that migrated. Therefore, we will ask the original respondents for information about their migrant children, including completed schooling, occupation, location, and remittances, as well as an estimate of that child's income.⁸

Credit constraints for individual households will be captured through questions about access to credit, sources of constraints and likely uses for unmet credit demand. Questions will be framed to distinguish four conceptually different outcomes: (1) cases where demand is non-existent (2) cases where demand is expressed but supply is completely denied (3) cases where demand is expressed but supply is rationed below amount demanded, and (4) cases where demand is expressed and supply meets demand in full. In order to accomplish this, transaction-specific questions will be asked in order to elicit information on: the reasons behind loan applications (or non-application); lenders (formal and informal) to whom loan applications were submitted; information on applications which were completely rejected; information on applications where the loan was provided but rationed, and information on fully funded loan applications. Sufficiently detailed questions in the survey will enable more precise measures of

credit access by accounting for the heterogeneity among households sources and timing of demand.⁹

These will be supplemented by questions on the number, types, and the value of various savings instruments used by households. A detailed inventory of financial assets owned by the household will be made as well. Survey instruments developed at IFPRI (Zeller et al. 2001 and Diagne and Zeller 2000) will be used to elicit information on transactions related to both credit and savings.

Data from a community questionnaire will also be collected to capture differences in availability and quality of financial services. The use of both household and community questionnaires will make it possible to identify supply and demand factors affecting the performance of rural capital markets, including the development of new credit and savings institutions in both the formal and informal sectors. Retrospective questions in the household survey will elicit information on the timing and extent of participation in informal and semi-formal credit institutions over the last ten years, with a more detailed focus on the previous year. Also, the community-level interviews will include informal lenders and/or managers of savings and credit schemes, depending on the institutions identified as important in the qualitative study. Three major constraints to the formation of financial institutions will be addressed: information asymmetries between market partners, lack of suitable collateral, and high transaction costs. One focus will be on contractual arrangements used by financial institutions to circumvent or ease these constraints, such as: methods used by various service providers to screen clients for creditworthiness; attributes of various types of contracts (explicit and implicit) that ensure that borrowers take those actions that make repayment more likely; means by which financial contracts are enforced effectively by various rural financial institutions; types of collateral and collateral substitutes used by different suppliers, including interlinked credit/land/labor contracts; and types of informal social sanctions used by households, extended families, informal groups, and communities to screen, monitor, and enforce financial contracts.

4.2 Empirical Analysis

4.2.1 Characterizing Rural Financial Markets and Credit Constraints

Credit Constraints. Our analysis of the effects of financial market access on investment decisions and welfare rests on our ability to separate the sample into cohorts of credit-constrained and – unconstrained households. Recent years have seen the development of a number of innovative techniques for identifying the incidence and depth of credit constraints. These techniques include: (1) inferences on credit access by examining the covariance of income and consumption over time, (2) direct identification of credit constraints in questions asked of sample households, and (3) investigation of the depth of credit constraints by examining household credit lines or credit limits. The proposed research on long run impacts of credit access and commercialization will use aspects of all three methods. We will begin with the second approach because it is most direct, but will use aspects of the first and third approaches to examine the robustness of our classification of households to methods used. Since we are interested in how *past* credit constraints affect asset accumulation over the intervening period and current well-being, the subsequent discussion will focus on how to use the 1984/85 data to arrive at alternative measures of credit constraints.

(1) *Consumption-smoothing approaches.* While previous studies on consumption-smoothing have provided us with a useful tool to assess the role of credit and savings as insurance substitutes, this approach has not provided much information on the ability of poor households to utilize financial services to make permanent improvements in their standard of living.¹⁰ A major difficulty of these studies is the classification of households into cohorts of credit constrained and unconstrained households since the constraint is unobserved.¹¹ Moreover, these studies do not identify the *type* of constraint the household faces, and hence, do not offer any guidelines regarding which type of constraint is binding and can be relieved by innovations in rural financial services. More recent studies, however, have attempted to overcome some of the limitations of the earlier literature by examining differential responses to positive and negative income shocks (Kochar 1995, 1999; Dercon and Krishnan 2001; Kurosaki 2002), examining the extent to which households use various coping mechanisms in response to income shocks (see the

review of studies by Skoufias and Quisumbing 2002), and estimating household-specific measures of consumption variability (Skoufias and Quisumbing 2002). Household-level measures of consumption variability can be computed from the 1984/85 data and can be used to classify households into constrained or unconstrained.

(2) *Approaches based on households' responses.* The second approach to identifying credit constraints relies on households' responses to several *qualitative* questions regarding their loan applications (or the absence of one), application rejections and rationing during a given recall period. We can then regress this classification onto household characteristics to obtain estimates of the likelihood of a household being credit constrained, given a set of household characteristics.¹²

This will be the central approach used to identify credit constrained households and the source and depth of constraints in the Philippine data. Because respondents' ability to perceive constraints and understand their behavioral responses to them may be limited, we will compare results obtained through survey questions to those from the first and third approaches outlined here. This will also provide a useful test of the robustness of all three approaches.

Rounds 2-4 of the 1984/85 data included questions on credit use and constraints as part of production questionnaires for sugar, corn and rice producers and under other sources of income for all households. These data capture credit use over a full year in three periods. In addition to the amount borrowed and source, respondents were asked why they did not receive credit, if they needed more production credit than they obtained, how additional credit would have been used, and why they thought they could not obtain more credit. These data make it possible to observe the classification of individual households into constrained and unconstrained cohorts and to monitor the seasonal variation in that classification. Moreover, they also make it possible to elicit some information on the depth of credit constraints and sources of excess demand for credit. The following is a brief summary of the credit data from the sugar and corn producer's questionnaires (covering the two major crops) and from the other sources of income questionnaire.

(a) Sugar Producers' Questionnaire. Out of 448 households in the 1984/85 sample, 102 grew some sugar. Of these, 62 households (61%) borrowed cash for sugar production in at least one round. Another 7 households borrowed inputs (in-kind) directly. See Table 2 for a summary of loans by round. For each loan, there is coded data on the source of the loan, type and amount of collateral, terms of repayment, and use of the loan. Other questions capture credit constraints and their nature. Between 25 and 35 percent of sugar farmers claimed to be quantity constrained in production credit. Respondents who claimed to be quantity constrained were asked how additional credit would be used. Sixty-four percent of farmers sought additional financing for the purchase of fertilizer. A related question identifies why more credit is not used; high interest rates and difficulties meeting repayments are among the most common responses. Households not using credit were asked why; responses for round 4 are provided in Table 3.

Table 2— Loans for Sugar Production, By Survey Round

	Round 2	Round 3	Round 4	Total/All
No. sugar producing HHs	102	102	102	
No. HHs borrowing cash	36	24	25	85
No. HHs borrowing inputs	5	1	2	9
Median nominal loan size (pesos)	1500	2000	3000	2000
Use more prod credit if avail? No	72	63	62	
Yes	24	34	26	

Table 3— Reasons for Not Borrowing

Why don't you get production credit?	Freq.	Percent	Cum.
Avoid at paying time	14	15.05	15.05
Have sufficient funds	10	10.75	25.81
Afraid can't pay back	9	9.68	35.48
Interest too high	9	9.68	45.16
Only family labor	5	5.38	50.54
Have credit in bank	6	6.45	56.99
Small production only	7	7.53	64.52
Land owner pays exp	2	2.15	66.67
N/A	31	33.33	100.00
Total	93	100.00	

(b) Corn Producers' Questionnaire. Summary statistics for corn producers from rounds 3 and 4 of the survey are provided in Table 4. Out of 368 farmers that grew corn in at least one round, 117 (32%) took

either a cash or in-kind loan. In-kind input loans were a more important source of credit for corn farmers than sugar farmers, which is consistent with the commercialized nature of the sugar crop. Farmers claiming to be quantity constrained in credit access represented 31 percent and 38 percent of corn farmers in rounds 3 and 4, respectively. Tables 5-7 summarize the source of cash loans and some information on the nature of credit constraints for corn producers in these two survey rounds.

Table 4— Loans for Corn Production, by survey round

	Round 3	Round 4
No. corn producing HHs	315	333
No. HHs borrowing cash	24	32
No. HHs borrowing inputs*	37	75
Median nominal loan size (pesos)	500	484
Use more prod credit if avail? No	216	208
Yes	99	125
Obligated to sell corn to lender? No	97	124
Yes	34	82

*All input loans in round 4 were loans of fertilizer.

Table 5 — Source of Cash Loans

LOAN 1	Round 3	Round 4
0		1
SUKI (regular source)	6	13
NEIGHBOR		1
RELATIVES	9	5
FRIEND	4	9
LANDLORD	3	3
BANK	3	1
Other	1	
Total	26	33

Table 6— Source of Unmet Demand for Credit

HOW WOULD MORE CREDIT HAVE BEEN USED?	Round 3	Round 4
TO BUY FERTILIZER	41	69
FOR FARM EXPENSES	49	44
TO BUY FOOD/FOR FAMILY EXPENSES	12	8
TO BUY FARMLOT/LAND	2	1
TO BUY A PIECE OF LAND AND ANIMALS	1	2
NOT APPLICABLE	232	221
Total	337	345

Table 7— Reasons for Being Credit Constrained

REASON WHY CANNOT GET MORE CREDIT	Round 3	Round 4
NOT NECESSARY		1
HARD TO PAY DEBTS, TOO MUCH HASSLE	102	99
HIGH INTEREST RATE	3	10
STILL HAVE PREVIOUS DEBTS	4	12
SMALL HARVEST, SMALL PIECE OF LAND	39	43
DID NOT OWN LAND	5	3
FAMILY CAN MANAGE ON OWN	24	16
STILL HAVE ENOUGH CASH ON HAND	24	19
WE WILL BE FORCED TO SELL HARVEST	1	3
NO RESPONSE	5	1
NOT APPLICABLE	130	138
Total	337	345

(c) Other Sources of Income (Non-production Credit). This section of the questionnaire has both borrowing and lending information. In the borrowing data, there are 389 loans taken by 240 households. Although these are not supposed to be production loans, 20% of the loans were taken to buy land, and nearly 5% were used to buy fertilizer. Median loan size was 700 pesos, and the mean was 4461 pesos. Other variables for these loans include year borrowed, original principal amount, type of collateral, and terms of borrowing and repayment. In the lending data, 116 of the sample households made 166 loans, with a median size of 500 pesos.

(3) *Credit rationing*. We can also use the third approach to get a better idea of what drives credit rationing: risk or quantity restrictions. Quantity rationing occurs when potential borrowers who do not have sufficient collateral are involuntarily excluded from the credit market. Risk rationing occurs when lenders, constrained by asymmetric information, shift so much contractual risk to the risk-averse borrower that the borrower withdraws from the credit market, even if he or she has enough collateral to qualify for a conventional loan contract (Boucher and Carter 2001). Using the third approach, a household is defined as having access to a particular source of credit if it is *able* to borrow from that source, even though, for some reasons, it may choose not to borrow. The extent of access to credit from a given source is measured by the *maximum* amount a household can borrow (*credit limit* or *credit line*) from that source. A

household is *participating* in a financial market only if it is actually borrowing from a source of credit. The distinction between *access* and *participation* matters if a household may benefit from mere access to credit even if it does not actually decide to borrow (Diagne 1999; Diagne and Zeller 1997; and Diagne, Zeller, and Sharma 1997). By including explicit questions on access to credit as well as actual loans availed of, we will be able to distinguish credit constraints due to risk or quantity rationing. We do not have information on this in the 1984/85 survey, but will include questions on this in the proposed survey.

Collateral and Market Interlinkages. We will also be able to examine the role of collateral in interlinked markets. In the 1984/85 survey, many credit transactions took place in kind. In each round, 60-70 percent of loans taken by corn farmers for production purposes were made in the form of fertilizer, conditional on the harvest being sold to the creditor.¹³ Our research will investigate how the prevalence of these linked transactions changes with the availability of other sources of credit and the presence of credit constraints for the household.

Development of Informal Financial Institutions. Evidence from secondary sources (NEDA 2001) shows a considerable increase in prevalence of informal financial institutions in rural Philippines, including group-lending programs and ROSCAs.¹⁴ Through data available from the household and community questionnaires, we will investigate how the timing and location of the development of these institutions reflects failure of formal savings and credit markets, the prevalence of credit constrained households, the sources of demand for credit, and the degree of commercialization of production.¹⁵ Clarifying the nature of financial constraints faced by rural households and pinpointing gaps in existing systems of service delivery will provide a much firmer basis to formulate newer and better policies that ensure a tighter – and therefore, more productive and sustainable – fit between demand and supply.

4.2.2 Linking Credit Constraints to Physical and Human Capital Accumulation

We then investigate the long-run effects of credit constraints identified in 4.2.1 on the accumulation of physical and human capital, specifically household and farm assets, child education, and individual nutritional status. The empirical model will also take into account differential effects of credit constraints between cash-crop and food-crop farmers. The Bukidnon data has many strengths for this

type of analysis: we observe credit constraint classification, degree of constraint, and asset portfolio for each type of asset in the base year 1984/85, asset holdings in 1992, and assets and credit status in 2002. We will use a multifaceted approach to shed light on the pathways from initial credit constraint to asset accumulation over time. The first step is to test whether those who were identified as credit constrained in 1984/85 using the approaches of Section 4.2.1 had lower growth in capital stocks from 1984/85 to 1992. We can then identify the probability of being credit constrained in 2002 as a function of (observed) credit status in 1984 and (implied) status in 1992.

A central focus of the analysis will be an exploration of the growth of capital stocks (household assets, farm assets, education of children, nutritional status) from 1992 to 2002 as a function of credit constraints in 1984, controlling for credit status in 1992 and 2002. Identification of these effects may be difficult because of the long time lag between the two events and the potential for a variety of other shocks to the household during this time. We will use the series of retrospective questions honed during the qualitative survey and incorporated in the household and community questionnaires to control for many of these intervening events that could have affected the linkage between past credit constraints and investment and that may proxy for credit access in the intervening period.

The general approach to estimation is an endogenous switching regression model in which the coefficients in the regression explaining growth of capital stocks or the probability of being credit constrained in the current period (1992 or 2002) are allowed to differ depending on the classification of the household into two regimes: credit constrained or unconstrained in 1984/85. We briefly introduce the model here as an overview of the estimation strategy. The effect of credit constraints can be captured in an empirical model of the form

$$(1.1) \quad K_i^* = W_i \gamma + u_i$$

$$(1.2) \quad Y_{1i} = X_{1i} \beta_1 + \varepsilon_{1i} \text{ if } u_i > -W_i \gamma, \text{ and}$$

$$(1.3) \quad Y_{2i} = X_{2i} \beta_2 + \varepsilon_{2i} \text{ if } u_i \leq -W_i \gamma,$$

where K_i^* represents the latent degree of constraint in access to credit in 1984/85 for the i th household. Y_{1i} is the outcome variable of interest, such as current asset holdings or nutritional status, the change in these capital stocks from 1992-2002, or the current degree of credit constraint, if the household is credit constrained. Y_{2i} is similarly defined for unconstrained households. Also, X_{1i} and X_{2i} are vectors of regressors that explain the outcome variable for constrained and unconstrained households, respectively; W_i contains variables explaining whether a household is credit constrained; β_{1i}, β_{2i} , and γ are parameters to be estimated; and $\varepsilon_{1i}, \varepsilon_{2i}$, and u_i are mean zero error terms. We assume that the vector of error terms in the outcome and switching equations are jointly normally distributed

$$(\varepsilon_{1i}, \varepsilon_{2i}, u_i)' \sim N(0, \Sigma) \quad \text{with} \quad \Sigma = \begin{bmatrix} \sigma_{11} & \sigma_{12} & \sigma_{1u} \\ \sigma_{12} & \sigma_{22} & \sigma_{2u} \\ \sigma_{1u} & \sigma_{2u} & 1 \end{bmatrix}.$$

That is, error terms may be correlated across equations in (12). Otherwise, if $\sigma_{1u} = \sigma_{2u} = 0$, this model is an exogenous switching regression.

An indicator variable k_i equal to 1 if the i th household is credit constrained ($K_i^* > 0$) and zero otherwise can be constructed using any of the three techniques for identifying credit constraints outlined above. These approaches effectively make the credit constraint “observable”, which substantially simplifies the estimation.¹⁶

This model can be estimated by maximum likelihood techniques to achieve full efficiency, or consistent parameter estimates can be obtained using a Heckman selection procedure to correct for selection into the credit-constrained or –unconstrained regimes in equations (1.2) and (1.3) using estimates from (1.1). If Y_{1i} and Y_{2i} are latent variables representing say, degree of credit constraint in 2002, then (1.2) and (1.3) have a probit model structure for normally distributed errors. Under observable regime selection, this type of model has been estimated by Kimhi (1999).

We will also allow for the effects of credit constraints to differ between sugar and corn farmers. This will require adding an equation to model to account for the crop choice decision for those households living “near” the sugar mill.¹⁷ This equation, of the form

$$(1.4) \quad S_i^* = Z_i\delta + v_i,$$

represents the net benefits from choosing to grow sugar rather than corn. We observe only whether households living close enough to the mill that sugar production is profitable chose to grow some sugar, which can be indicated by a dummy variable s_i equal to one if $S_i^* > 0$ and zero otherwise. The vector Z_i includes regressors that affect the decision to adopt sugar production. Most farmers adopting sugar in this area made the decision to do so soon after the sugar mill was put in place in 1977. Unfortunately, we do not observe credit status for these households at that time, so we cannot easily account for the role of credit in that crop choice decision. However, we can further refine the estimation of the outcome equations to account for the selection caused by this crop choice decision as well as credit constraint status. This results in a system of six equations, one for credit constraint status in 1984/85, (1.1), one for crop choice (1.4) and four equations for the outcome of interest, controlling for the four combinations of credit status ($k_i=1$ or 0) and crop choice ($s_i=1$ or 0). This system of equations is estimated allowing correlation between error terms in the equations, which recognizes the potential for unobserved characteristics to affect asset accumulation, crop choice and credit status. Any time-invariant household-specific effects can be removed from this system through fixed effects estimation. The validity of the separation of the sample into constrained and unconstrained regimes can be tested via exclusion restrictions on the appropriate parameters. For example, investments in child nutritional status through consumption expenditures on food and healthcare should be unaffected by the amount of credit or savings for households that are not classified as constrained in the credit market.

Using these techniques, it will be possible to test for differences in the long-run effects of credit access on the accumulation of specific types of assets and to investigate the effects of degree of commercialization of production on portfolio choice.¹⁸ We will also test whether the asset accumulation

of adult children, through childhood education and nutrition as well as current nutritional status and household assets, are affected by previous credit status of their parents. Thus, it will be possible to link this research on rural financial markets to many important issues in intrahousehold resource allocation that have been difficult to explore due to a limited number of panel data sets that cover a sufficiently long time period.

Two issues which will affect the validity of our estimates need to be addressed: (a) life cycle issues; and (b) attrition bias. We address these in turn.

(a) Life cycle issues. Life cycle considerations affect the timing of asset accumulation and decumulation. Accumulation typically occurs in the earlier stages of the life cycle, and decumulation in later years, as households draw down savings to finance consumption. A key occasion for asset decumulation in the older generation is the transfer of assets to the younger generation at the time of marriage (Quisumbing 1994). In the rural Philippines, where old-age support typically comes from one's children, investments in human capital and wealth transfers to children are a means of guaranteeing security in one's old age. Unless such life-cycle factors are taken into account, one might erroneously conclude that older households are less wealthy when in fact they have already made transfers to their children. We propose to address these life cycle issues not only by including controls for age and age squared, but by drawing on information on changes in household structure and asset transfers to the younger generation.

(b) Attrition bias. Sample attrition or loss to follow-up can introduce biases into analyses if the attrition is not random. While this potential problem of selection bias due to non-response exists in cross-sectional surveys, it is typically exacerbated in longitudinal data due to the difficulties inherent in interviewing the same individuals multiple times over long periods of time. As noted above, field work in 1999 indicated that we can expect attrition in the Bukidnon sample in 2002-03 to be somewhat higher than 10%, which is not severe considering the long time lag. Still, this level of attrition could be sufficient to lead to bias in estimation. Attrition in our sample will be the result of two broad factors: (1) death; and (2) failure to trace and re-interview those individuals who are living. Fitzgerald, Gottschalk,

and Moffitt (1998) suggest a simple test for attrition bias in panel data using first round information supplemented by knowledge of whether the individual attrited at a later date. We estimate the relation of interest using the entire set of first-round information on the right hand side variables, and then include the interactions between the regressors and the attrition indicator as right side variables. The aim is to determine whether those who subsequently leave the sample differ in their initial behavioral relationships. If the interactions are significant, then it should be taken as a warning sign for attrition bias.

If attrition bias is found, estimation of a selection-corrected model is possible if there exist regressors which are correlated with attrition but not correlated with the error term. To the extent that they are good predictors of attrition, whether or not the household is a sugar- or corn-producer may prove to be a useful instrument in this setting. Fitzgerald, Gottschalk, and Moffitt also outline a battery of tests for selection on observables. If selection is based on observables, one needs to test whether attrition biases our estimates of the coefficients of interest. Their proposed solution involves estimating an attrition function using the (endogenous) outcomes in the first period, and then estimating the model of interest by weighted least squares where the weights are constructed from the first stage attrition function.

4.2.3 Linking Asset Accumulation, Economic Mobility and Well-being in the Long Run

The empirical strategy employed in the previous section will enable us to examine the various pathways linking credit constraints to a household asset portfolio and choice of activities. A first step at analyzing economic mobility would involve examining the determinants of income (or consumption) growth between 1984/85 and 2002/03. While we can estimate income determination functions separately for both periods (Scott 2000; Estudillo et al. 2001) and ascertain whether returns to different factors of production have changed over time (with corrections for possible attrition bias), such an approach does not take full advantage of the panel nature of the survey. A different approach (Dercon 2001) uses a profit function framework to explain income/consumption growth using prices, endowments of physical capital, labor, human capital, and location characteristics, controlling for shocks which may have occurred in the intervening period.

Total income is defined as the sum of profits from the entire range of household farm and nonfarm activities, and is expressed as a function of input and output prices, fixed factors and exogenous shocks. Since income comparisons are being made over a long period, one expects that a number of income determinants will have changed. First, it is possible that macroeconomic reform and structural adjustment programs may have affected input and output prices. Secondly, households may have accumulated or decumulated some of their fixed inputs, in part due to life cycle effects. Thirdly, there may have been some changes in the technology employed--relative output and input price changes may have induced a shift in the optimal portfolio, implying some changes in the optimal technology used. Finally, households may be subject to a different set of shocks in each time period. Estimating a profit function in first differences will provide estimates of the different elasticities relative to prices and changes in fixed inputs, controlling for household-specific heterogeneity using fixed effects. At the same time, an estimate is obtained for any changes in these elasticities over time due to changes in the underlying technology of combining inputs. Estimation of first differences differentiates the effects of price changes from changes in the household endowments and from shocks faced by the household. This is very similar to Oaxaca-Blinder (Oaxaca 1973, Blinder 1973) decompositions which decompose income changes into the change in the use of the factor and the change in the returns to that factor. The same approach can be used to decompose an additively separable poverty index, which is linear in the dependent variable used in the profit function regressions, into components due to changes in input/output prices, fixed factors, and exogenous shocks. This approach can also be extended to a range of other outcomes, such as consumption and nutritional status.¹⁹

5. Policy Relevance of Research

The proposed research program is consistent with both the priorities of the Government of the Philippines' Medium Term Plan (MTP) and USAID's program of assistance for the Philippines. The MTP mentions the following priorities: (1) to develop the banking and capital market, including improving financial intermediation through support given to microfinance institutions; (2) to develop

Mindanao as a food basket and exporter of high value agriculture and fisheries products; (3) to protect vulnerable groups through better delivery of social services, including microfinance programs. Through its Growth with Equity in Mindanao (GEM) program, USAID is carrying out a wide range of activities aimed at equity-oriented economic growth in Mindanao, the Philippines' poorest region. The GEM area of emphasis relevant to this research is related to introduction or expansion of agricultural commodities that offer particular promise for Mindanao (export crops). Moreover, USAID is working with large numbers of rural banks and credit cooperatives in Mindanao to help them develop the capability to profitably serve the microenterprise market.

6. Capacity Building

The proposed research program also includes capacity strengthening activities for our collaborator institution, Xavier University. The departments to be involved would be the College of Arts and Sciences, specifically the Department of Sociology and Anthropology and the Department of Economics, and the College of Agriculture. Our other collaborator is based at the University of the Philippines School of Economics, the premier training institution for economists in the Philippines. The proposed activities would involve strengthening the capacity of Xavier University as well as building stronger linkages between Xavier and other policy research institutions in the Philippines such as UPSE. The following activities are proposed:

Training Activities for Xavier Faculty. Xavier and IFPRI will jointly organize a series of training seminars whereby IFPRI staff members and some faculty from the University of the Philippines will conduct short courses on mutually agreeable topics at Xavier University. This will take place in years 1 and 2 of the project (see time line).

Mini-Sabbaticals for Philippine Collaborators. Philippine collaborators would visit IFPRI for short periods as Visiting Research Fellows in order to work more intensively on research, as well as attend professional conferences in the US. Previous IFPRI experience has indicated that such short visits have been very productive in helping developing country collaborators, who often cannot take extended

leaves from their work, to establish networks in the US academic and development community and to publish in international journals. This will take place in years 2 and 3 of the project.

B. ANTICIPATED OUTPUTS

1. Research Outputs/Policy Briefs

The research program will come up with a series of outputs related to the three analytical stages of the program: (1) characterizing rural financial markets; (2) linking credit constraints to physical and human capital accumulation; and (3) linking asset accumulation to well-being. Three types of outputs are envisioned under this program: (1) research-oriented output, suitable for publication in a peer-reviewed journal; (2) technically-oriented output, which would be targeted to technical personnel in government agencies in the host country; and (3) policy briefs, which would be targeted to host country and international policymaking audiences. The technical outputs and policy briefs would be disseminated in policy seminars to be discussed below. The outputs of each stage are listed in Table 8.

2. Outreach to Local Policymakers

One of the main audiences of this research program is policymakers and development practitioners in developing countries (governments and civil society) as well as donors who can make decisions regarding interventions that have the potential to reduce poverty by improving the functioning of rural financial markets. Thus, in addition to the proposed outreach and dissemination activities to USAID officials, the proposed research program will also include seminars and other dissemination activities targeted to the Philippine academic and policymaking communities, at both national and regional levels, including: the National Economic and Development Authority, the Philippine Institute for Development Studies, the Central Bank of the Philippines, as well as professional economic organizations such as the Philippine Economic Society. RIMCU also has a long-standing relationship with the National Economic and Development Authority (NEDA) in Region 10, which has named RIMCU an associate member of the Regional Development Council. RIMCU has also worked with local government units at the municipal

Table 8 — Research Outputs, Technical Papers, and Policy Briefs from Research Program

	Research Output	Technical Papers	Policy Briefs
Rural Financial Markets	<ul style="list-style-type: none"> • Qualitative and quantitative research papers characterizing rural financial markets in Bukidnon, including changes in the demand for and supply of financial services over the two study periods 	<ul style="list-style-type: none"> • Technical papers on rural financial markets with implications for improving the delivery of financial services to rural areas, with an emphasis on microfinance 	<ul style="list-style-type: none"> • Series of policy briefs on rural financial markets for policymakers
Credit Constraints and Asset Accumulation	<ul style="list-style-type: none"> • Qualitative study examining the types of credit constraints faced by rural households and their impact of asset accumulation • Quantitative study analyze the impact of credit constraints on portfolio choice and risk-diversifying strategies 	<ul style="list-style-type: none"> • Technical papers on credit constraints and asset accumulation and their implications for production strategies and farm incomes 	<ul style="list-style-type: none"> • Series of policy briefs on credit and capital accumulation
Asset Accumulation and Well-being	<ul style="list-style-type: none"> • Quantitative paper decomposing changes in consumption and poverty as a function of assets, changes in returns to assets, and exogenous shocks 	<ul style="list-style-type: none"> • Technical paper linking credit constraints, assets, economic well-being, and poverty 	<ul style="list-style-type: none"> • Series of policy briefs on assets, economic mobility, and poverty changes over time

and provincial levels, as well as national government agencies and NGOs in Mindanao. Since civil society is an important player in the Philippine policy arena, these dissemination activities will include participants from various civil society organizations representing the rural sector. RIMCU, the University of the Philippines School of Economics, and the Philippine Center for Policy Studies (based at UPSE)

will take the lead in organizing these outreach activities. The IFPRI PI was formerly a staff member and an affiliated researcher of the latter two institutions and has maintained contact with them over the years. Because IFPRI has undertaken studies on rural finance in a number of developing countries, the results from the Philippine study will be placed in the context of the multi-country study. Policy seminars for local policymakers are scheduled in Years 2 and 3 of the project (see time line).

3. Synthesis Volume

At the end of the study, the research team will produce a book which synthesizes the results from each area of the research program; this book will either be in the IFPRI Research Report series or published by the Johns Hopkins University Press.

4. Methodology Manual

As part of the capacity building component of this research program, the investigators will document and write up the data collection and analytical methodology used, in order to come up with a set of training manuals for the study of rural financial markets and the consequences of differences in credit access.

5. Public Access Data Sets

All data sets collected by IFPRI will be in the public domain, in accordance with IFPRI's data release policy.

C. TIME LINE

Activities in 2002-03										
	2002		2003							
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Planning meeting										
Design of qualitative study protocols										
Field visit to Philippines/Philippine project launch										
Field work for qualitative study										

Activities in 2002-03										
	2002		2003							
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Draft of qualitative study completed										
Review of existing questionnaire modules, analysis of 1984/85 data										
Pretest new modules (IFPRI and RIMCU staff) Training seminars for Xavier staff										
Quantitative survey (recall of Jun02-Jun 03)										

Activities in 2003-04												
	2003			2004								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Quantitative survey (cont'd)												
Data entry and cleaning												
Policy seminar on qualitative study/Training seminars for Xavier staff												
Creation of analysis files from new survey												
First mini-sabbatical at IFPRI												
Analysis												
First descriptive paper on financial markets												

Activities in 2004-05												
	2004			2005								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Analysis												
Completion of paper on financial markets												
Paper on credit constraints and asset accumulation												
Paper on economic mobility over medium term												
Second mini-sabbatical at IFPRI												
Writing of final reports												

Activities in 2004-05												
	2004			2005								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Policy seminars in Philippines												
End of project workshop												

D. BUDGET (See Attached)

The total budget for the three-year period amounts to \$439,477 of which \$300,000 is requested from BASIS, with the remainder being provided by IFPRI through matching grants. Matching grants from IFPRI will take the form of salaries of IFPRI staff working on the project (1296 hours of senior research staff time), equivalent to \$99,201, some international travel costs, as well as funds for external publications. External publications do not appear in the budget but will be part of IFPRI’s in-kind contribution to be paid out of indirect costs. Thus, the \$139,477 represents a lower-bound of IFPRI’s in-kind contributions to the research program.

IFPRI expects that 15% of staff time will be dedicated to training activities in the host country, or an equivalent of \$14,880. Only out-of-pocket costs (room rental, meeting expenses) are included in the training budget.

IFPRI has also begun approaching other donors for supplementary funding to accomplish the original scope of the proposal, to include follow-ups of migrants from nearby municipalities and a more detailed analysis of long-term nutritional impacts. Funding from BASIS will be crucial to mobilizing these additional funds.

See the attached budget forms for details.

E. RESEARCHER QUALIFICATIONS

Agnes Quisumbing, IFPRI principal investigator on this proposal and a Filipino national, is a Senior Research Fellow in the Food Consumption and Nutrition Division of the International Food Policy Research Institute. She has M.A. and Ph.D. degrees in economics from the University of the Philippines, Quezon City and was a Fulbright-Hayes Doctoral Enrichment Grantee at the Massachusetts Institute of Technology. Prior to joining the IFPRI staff in 1995, she had been on the faculty of the University of the

Philippines at Los Banos, the School of Economics, University of the Philippines, Quezon City, an Affiliate Postdoctoral Scientist at the International Rice Research Institute, Los Banos, Philippines, a Visiting Fellow, Economic Growth Center, Yale University, a Consultant and then Economist in the World Bank. She has considerable field experience in Asia, Africa, and Latin America in the areas of land tenure and intrahousehold allocation. Her work in the Philippines focused on land tenure issues in diverse production environments and intergenerational transfers. Subsequent work in Sumatra and Ghana analyzed the implications of the evolution of customary land tenure institutions on productivity and equity. She has also studied various dimensions of human resources and intrahousehold allocation in developing countries, including how the resources that women bring to a marriage affect allocations of resources within households with important implications for child development. Currently she is involved in a longitudinal study focusing on the impact of early childhood nutrition on human capital accumulation and economic productivity in Guatemala and an evaluation of the long-term effects of food aid on child nutrition in Ethiopia.

Linda Montillo-Burton, Director of the Research Institute on Mindanao Culture, Xavier University, is the principal investigator from the Philippines. She has an M.A. in Anthropology from Brigham Young University and a Ph.D. in Anthropology from the University of Pittsburgh. She has held various teaching positions in Imperial Valley College, California, Universidad de Baja California, Mexicali, Mexico, and Xavier University, Cagayan de Oro, Philippines, and was an exchange professor at Virginia Polytechnic and State University. She has also held research positions at the Imperial Valley College Museum, the National Museum of the Philippines, and has been with RIMCU since 1981. She has been director of RIMCU since 1996. Her professional work has been in the following areas: archaeology and prehistory of Southeast Asia, Asia, Oceania, and Mexico; ecological anthropology; social and culture change; community health medicine; women's issues; environment and natural resource management; ethnohistory; peoples and cultures of Insular Southeast Asia and Oceania; political anthropology; and applied anthropology.

IFPRI Team:

Howarth Bouis, Senior Research Fellow in the Food Consumption and Nutrition Division, was the Principal Investigator of the original Bukidnon study. He currently directs the micronutrients project of the Consultative Group on International Agricultural Research, a collaborative effort among a number of research centers to breed for micronutrient-dense staple food crops and to understand how programs and policies can be modified to improve the quality of diets among the poor in developing countries. His past research has concentrated on understanding how economic factors affect food demand and nutrition outcomes, particularly in Asia. Bouis, a U.S. citizen, received his B.A. in Economics from Stanford University and his M.A. and Ph.D. from Stanford University's Food Research Institute.

Manohar Sharma has been with IFPRI since 1993. Between 1995 and 2001 he was the co-team leader and subsequently the team leader of the of IFPRI's multi-country research program on Rural Finance and Poverty Alleviation research program in IFPRI. Within this program, he completed several studies of microfinance programs in Asia and Africa looking at issues concerning risk-coping and insurance strategies of poor households, institutional innovations in poverty-oriented financial services, and the impact of microfinance programs on livelihoods of the poor. He has considerable experience in poverty measurement and analysis and was involved in estimating and analyzing poverty levels in Egypt and Malawi using nationally representative household surveys. In both the countries he was intimately involved with the design and implementation of household surveys on which the poverty analyses were based. He also has experience in designing poverty monitoring systems and was one of the principal co-authors of an indicator-based poverty assessment manual that has gained wide acceptance among international supporters of microfinance. Currently, he is working on issues related to poverty dynamics

using a household panel dataset that is being collected in Malawi. He is also studying factors affecting scaling-up of community driven development initiatives, using case studies from India and Nepal. He obtained his Ph. D in Agricultural Economics from Cornell University in 1998 for which he undertook a year-long fieldwork in Nepal and completed a dissertation on the impact of rural institutions of insurance on subsistence consumption of poor households. Prior to that he was an economist at the Agricultural Projects Services Center in Nepal where he worked on issues concerning food price and marketing policies, and the design and evaluation of rural development programs.

Daniel Gilligan joined IFPRI as a Postdoctoral Fellow in May 2002. He is completing a Ph.D. in agricultural economics at the University of Maryland, where he also earned an M.S. degree. His work for IFPRI involves analyzing the targeting effectiveness of a national, nutrition-oriented poverty alleviation program in Brazil. Gilligan's dissertation research concerns the economics of agricultural labor exchange teams in Indonesia, and uses data that he helped collect during field work in 1999. Prior to joining the University of Maryland, he worked for the Harvard Institute for International Development for three years in Cambridge and Indonesia. His previous research has addressed the role of social capital in public good provision, the effectiveness of targeting through food-for-work programs, and measurement and estimation issues in welfare analysis. He also received a masters degree in development economics from the Fletcher School of Law and Diplomacy at Tufts University in 1992 and a B.A. in mathematics from Holy Cross College in 1988.

John Maluccio, Research Fellow, joined IFPRI as a post-doctoral fellow in 1997 to work on the research program analyzing the intrahousehold allocation of resources in South Africa and Ethiopia. Since that time, his research interests have expanded to include the formation and role of both human and social capital. Currently, he directs the evaluation of a Nicaraguan conditional cash transfer program aimed at improving the human capital of children and a longitudinal study in Guatemala examining the role of early childhood nutrition on adult human capital and economic productivity. A U.S. citizen, John holds a B.A. in mathematics and economics from Amherst College and a Ph.D. in economics from Yale University.

Philippine Team:

Beethoven C. Morales is the Chairperson of the Department of Economics, Xavier University, and Senior Research Associate at RIMCU. He has an MS in actuarial science from the University of the Philippines, Quezon City, an MBA from the Philippine Christian University, and his M.A. and Ph.D. in Economics from the University of Hawaii, Honolulu. His areas of specialization were econometric theory, labor economics, and the economics of population. He has received research grants from the Ford Foundation, Family Health International, and the Konrad Adenauer Foundations, among others. His recent work has been in the areas of analyzing the impact of devolution on community-based management of forest resources, assessing the impact of training on participatory governance and community development, and the political economy of corporate social and environmental responsibility. He is also a consultant to an NGO in Bukidnon which provides various types of financial assistance to small farmers.

Jonna P. Estudillo, who will be joining the faculty of the University of the Philippines School of Economics in November 2002, is currently Visiting Associate Professor / Fellow of the Foundation for Advanced Studies in Development at the National Graduate Institute for Policy Studies, Tokyo, Japan. She has a B.S. in Agricultural Economics from the University of the Philippines, Los Banos, an M.A. in Economics from the University of the Philippines, Diliman, Quezon City, and a Ph.D. in Economics from the University of Hawaii, Honolulu. After finishing her Ph.D., she was a postdoctoral fellow at the International Rice Research Institute and the Department of Economics at Tokyo Metropolitan University. Her research interests include income distribution and growth in the rural Philippines and

intergenerational transfers. While at Tokyo Metropolitan University, she collaborated with IFPRI on a study of long-term changes in land inheritance and education in the Philippines.

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ENDNOTES

¹ For example, there is evidence that improved access to credit leads to short run increases in output for credit constrained firms (Banherjee and Duflo 2002) and that credit use is associated with higher agricultural productivity in the short run (Carter 1989).

² A related question concerns how undernutrition affects future earnings and welfare. A more long run perspective is required to address this issue as well.

³ This is because: (1) only if services and products are usable by clients will the establishment of microfinance institutions effectively translate into increased access to financial services; (2) financial products not tailored to clients' requirements will produce limited impact, undermining the original objectives of establishing microfinance services for poverty alleviation. Because low-level impact translates into low financial returns to projects funded by the program, it is likely to worsen loan delinquency rates and therefore negatively affect the financial standing of the MFIs; and (3) from the client's perspective, there is not much incentive in maintaining a continuous long-term relationship with a MFI that does not deliver services that are of value to the client. Hence, inappropriate services are also likely to spur strategic default. While strategic market research studies in the field of microfinance are practically nonexistent, many important implications on the nature of product and services can be derived from the examination of clients' characteristics and the dynamic nature of financial constraints they face.

⁴ All other farmers are assumed to grow the food crop because they have no access to processing services for the cash crop.

⁵ The potential for changes in access to land resulting from commercialization of agriculture may also be considered.

⁶ We do have interim information on some of the study communities. The Philippine PI and RIMCU are currently involved in a study of 10 municipalities of Southern Bukidnon which will be targeted for investment projects focusing on the collection of socio-cultural and socio-economic data due to the presence of indigenous communities and the migrant settlers in the area. RIMCU also collected

household and community survey data from 250 HHs in 25 barangays. The qualitative data we have gathered include the changes in the physical environment; farming system; land use and tenure; entrepreneurial activities; gender issues; health; possible investments; needs and problems.

⁷ IFPRI is currently seeking additional sources of funding from the AID office in Manila and AusAID.

⁸ Although parental reports of income are obviously less reliable than self-reports, previous studies in the Philippines have been able to analyze lifetime incomes of both resident and migrant children (Estudillo et al. 2001).

⁹ For example, a loan product requiring immediate weekly repayment is of limited use for a farmer seeking loans to finance labor costs during the rice planting season.

¹⁰This approach has identified cohorts of constrained households by recognizing that, in the absence of credit constraints, consumption can be smoothed across periods and changes in consumption should be unrelated to variability in income. Evidence of covariance of income and consumption represents the presence of credit constraints (Zeldes 1989; Murdoch 1990). In addition, if data on financial transactions are available, the extent to which financial transactions responded to income variability or the unexpected occurrence of special events can also be examined (Rosenzweig 1990; Lund and Fafchamps 1997; Sharma 1998). Among the findings of studies in this category are that probability of being constrained is inversely related to size of landholdings in India (Morduch 1990), unexpected changes in income in Thailand were absorbed by changes in the level of savings, leaving consumption fairly smooth (Paxson 1992), that households with higher land wealth made greater use of credit to smooth consumption (Rosenzweig 1991), and that use of informal credit to smooth consumption was inversely related to income in Nepal (Sharma, 1998). However, these models only identify presence of credit constraints for the sample, for subsamples based on their characteristics, or for an arbitrarily selected subsample (e.g. Zeldes 1989). A further problem is that under conditions of uncertainty, incomplete consumption smoothing can result from prudent or precautionary behavior even if the household is not credit constrained (Zeldes 1989b; Kimball 1990; Carroll 1991). An important insight from the simulation

results of Deaton (1991) is that a credit-constrained household may still be able to smooth consumption with precautionary saving and thus not violate any implication of the life cycle/permanent income hypotheses.

¹¹ In a well-known paper, Zeldes (1989) attempts to overcome this problem by arbitrarily treating as constrained those households with predicted asset holdings worth less than two months of income for a US sample. Kochar's (1997) model of land leasing decisions assumes that households without credit are not credit constrained. She then estimates the leasing decision for the sample of borrowers, adding credit use on the right-hand-side. This leads to biased parameter estimates on the effects of credit if, as one would expect, her sample of borrowers includes many households that are unconstrained and if many non-borrowers are indeed constrained. Others have used switching regression models with unobserved sample separation to classify observations in other contexts (Dickens and Lang 1985; Hu and Schiantarelli 1998), but these models are notoriously sensitive to model specification.

¹² The method was first applied by Jappelli (1990) using data from the US 1983 Survey of Consumer Finances and by Feder et al. (1990) using data from a household survey in China. The method was subsequently used by Zeller (1994), Malik (1994), and Barham, Boucher, and Carter (1996) on household survey data from Madagascar, Cameroon, and Guatemala, respectively.

¹³ It is not clear whether repayment was made in-kind as well through future reversed transfers of fertilizer or whether payments were made in cash or output at harvest.

¹⁴ Providing credit to the poor through microfinance institutions is also an important component of the government's poverty alleviation program. The government grants funds to NGOs engaged in microcredit with competitive lending rates, and established a council of microfinance institutions composed mostly of private practitioners.

¹⁵ For example, just as interest rates vary with the source of demand for credit (people may be willing to pay a higher price to finance a health emergency than a new capital expenditure), the type of financial

institutions that arise will be driven by the importance of credit as a source of production financing, investment or consumption smoothing and insurance.

¹⁶ Other switching regression approaches to models with liquidity or credit constraints include Zeldes' (1989) application to consumption and Jacoby's (1994) study of schooling decisions. However, these models arbitrarily chose a cutoff point of liquidity and any household with predicted liquidity below that level was treated as constrained. The Bukidnon data offer improved approaches for separating the sample of households into constrained and unconstrained regimes.

¹⁷ An initial analysis of transportation cost data will be undertaken to identify the optimal division of the sample into those living "near to" or "far from" the mill, where near means sufficiently close to the mill that sugar production is viable. Other methods of capturing this commercialization opportunity that uses the continuous nature of the transportation cost variable will also be considered.

¹⁸ For example, the empirical analysis will consider whether credit constrained corn farmers are likely to invest more in liquid assets such as livestock than credit constrained sugar growers who have greater access to liquidity through product sales. This could explain lower investments in child nutrition and education among corn farmers.

¹⁹ We are also seeking funding to pursue complementary analysis of the long-run economic and nutritional outcomes of family investments in children and adolescents in rural households in the Philippines. This would be highly complementary to an ongoing research program on investments in children's nutrition and adult economic productivity in Guatemala, funded by the National Institutes of Health.