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SHOCKS, GROUPS, AND NETWORKS IN BUKIDNON, PHILIPPINES

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ABSTRACT

This study examines the role of groups and networks in helping poor Filipinos manage their exposure to risks and cope with shocks. It brings together two strands of literature that examine how social capital affects economic variables and investigate the processes by which social capital formation, participation in networks and groups, and trusting behavior comes about. Using a longitudinal study from a province in Northern Mindanao, Philippines, the authors find that households belong to a number of formal and informal groups and networks, but participation differs according to household characteristics. Households belonging to the lower asset quartiles belong to fewer groups, and households with more human and physical capital have larger social networks. Furthermore, wealthier households are more likely to take part in productive groups while membership in civic and religious groups is not limited by economic status. Migrant networks play an important risk-smoothing role via remittances sent by migrant daughters.

Keywords: social networks, groups, social capital, poverty, remittances, Philippines

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SHOCKS, GROUPS, AND NETWORKS IN BUKIDNON, PHILIPPINES

Agnes R. Quisumbing,[1] Scott McNiven, and Marie Godquin

1. INTRODUCTION

Belonging to a group is highly valued in Filipino society. Personalism, familism, and other values supportive of harmonious relationships in small groups, and the individual's personal network of selected relatives and other allies affect how Filipinos function in organizations (Arce, 2003). Whether Filipino organizational culture is compatible with development objectives has been debated in the Philippines since more "impersonal and more universal values such as the merit principle and the rationality of procedures in the Weberian sense" are not viewed as central to the Filipino organizational culture (Arce, 2003:1). Do local institutions have an instrumental value beyond their contribution to an individual's sense of belonging?

This study takes a broad perspective on different types of collective action in the rural Philippines, examining the role of groups and networks in helping the poor manage their exposure to risks and cope with shocks to their livelihoods. It brings together two strands of the social capital literature: the literature that examines how social capital, variously measured, affects economic variables (Pender and Scherr, 2002; Haddad and Maluccio, 2003; Narayan and Pritchett, 1999) and studies that investigate the processes by which social capital formation, participation in networks and groups, and trusting behavior comes about (Fafchamps and Gubert, 2007, Haddad and Maluccio, 2003). Specifically, the paper attempts to answer the following questions:

1. What kinds of shocks do rural households face? How do these shocks affect per capita consumption, and does the impact of shocks differ according to household characteristics?
2. What kind of formal and informal groups and networks do households join? Does exposure to risk encourage membership in such groups and networks?
3. What are the returns to membership in formal and informal groups and networks?

Underlying these questions is the issue of heterogeneity. By examining different types of collective action institutions in the Philippines—local formal groups and informal networks, and migrant networks composed of family members—we attempt to understand:

4. How does heterogeneity affect network formation and risk-smoothing; and
5. How do groups and networks use different mechanisms to enforce behavior in order to achieve their risk-smoothing objectives?

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For this paper, we investigate two types of social capital: formal, proxied/measured by membership in groups, and informal, proxied/measured by the size of trust-based networks. Both groups and networks can be local or spatially diversified. We take this broader view of network formation—looking beyond the village as the locus of network activity—in the light of recent studies (Munshi and Rosenzweig, 2005) that have begun to question the assumption that the appropriate unit of risk-smoothing is the village (Townsend, 1994). Munshi and Rosenzweig (2005) find that, in India, consumption is smoothed within sub caste networks, which extend beyond the village. Indeed, the literature on migration and remittances suggests that networks can cross geographic boundaries, with the formation of migrant networks in the destination being affected by shocks in the origin locality (Munshi, 2003) and remittances, and return migration being influenced by shocks in destination localities (Yang, 2006). This literature is especially relevant to the Philippines given the importance of both internal and external migration as a livelihood strategy (Quisumbing and McNiven, 2005, 2006).

Other studies have also found that the problems of asymmetric information and limited commitment mean that households are not likely to be fully insured against adverse shocks (Ligon et al., 2000; Foster and Rosenzweig, 2000). However, such analyses do not assess whether responses differ depending on the nature of the shock, and indicators for collective action and participation in different types of networks are generally either absent or rudimentary. For example, would norms of reciprocity—which are likely to characterize networks of close relatives—be more effective in enforcing risk-sharing commitments compared to more formal agreements entered into by members of credit groups? A study undertaken in the Cordillera region of the Philippines (Fafchamps and Lund, 2003) shows that risk-sharing appears to occur mostly in very small networks of close friends and families—networks in which enforcement may be easier, but which may not have the heterogeneity required to efficiently share risk.

While heterogeneity may be important for risk-sharing, in most empirical studies of its impact on collective action or on household incomes directly, the impact of any type of heterogeneity tends to be negative, or not significant (Ahuja, 1998; Alesina and La Ferrara, 2000; Bardhan, 2000; McCarthy and Vanderlinden, 2003; Place et al., 2004), with the interesting exception of results reported in Grootaert (2001) for studies in Burkina Faso, Bolivia, and Indonesia. It is often hypothesized that heterogeneity of any sort makes finding agreements mutually beneficial and acceptable to all more costly, and that sociocultural heterogeneity in particular is likely to reduce trust among group members and also to reduce the efficacy of social sanctioning (Easterly and Levine, 1997). On the other hand, much of the literature on group formation and networks highlights the added benefits to diversity (or heterogeneity) among members along any number of dimensions. Risk-pooling will certainly be more efficient when one's income is less correlated with other members in the group. Many networks exist to share information, and there may be economies of scope in terms of information gathering or accumulation of other assets. In this case, economic heterogeneity also favors pooling of resources to the benefit of all. Because there may be competing impacts of different types of heterogeneity on the functioning of groups, it becomes critical to examine which groups are able to harness the positive, and mitigate the negative effects, of heterogeneity, especially with respect to those groups serving the poor.

Finally, if groups differ in terms of degree of heterogeneity and geographic dispersion, what kinds of enforcement mechanisms are used to ensure compliance to network objectives and norms of behavior? Members of local networks are easier to monitor, but local networks are less able to insure against covariate shocks. Spatially diversified networks offer some protection against covariate shocks, but network members will be more difficult to monitor. If information and communications technologies are poor, more distant network members may not even be aware of a shock that occurred in their origin communities.

This chapter attempts to address these issues using rich longitudinal data and qualitative studies from Bukidnon, Philippines. We first describe the data, the context, and the types of shocks faced by rural households. We then examine their impacts on log per capita consumption, and whether these impacts vary across different types of households. We then compare and contrast the determinants of membership in groups and in informal networks, focusing on the role of initial wealth and heterogeneity in the accumulation of social capital. We then examine the returns to membership in two types of groups—formal groups and migrant networks—on various indicators of well-being. We conclude with some reflections on the effectiveness of local and migrant networks for enabling asset accumulation and consumption-smoothing.

2. DATA AND CONTEXT

Our data come from a longitudinal study 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, a landlocked province in Northern Mindanao, comprising 20 municipalities and two cities, Malaybalay and Valencia (see Figure 1). 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 nonfood 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.[2] The respondents listed all children who lived away from home, providing contact information for non-co resident children. We sampled at random up to two non-co resident children living in or near the origin household's village, yielding 261 households.

Figure 1. Map of the Philippines, indicating study area

[2] Godquin and Quisumbing (2007) model the determinants of the probability of being re-interviewed in 2003. They find that older households are less likely to be re-interviewed. The percentage of households affected by peace and order problems also contributes to the non-interview probability. However, households with a larger share of female working members in 1984 are more likely to be re-interviewed. Also, the proportion of non-attriters in the *barangay* between the first and fourth survey rounds in 1984/85 is associated with higher re-interview probabilities. We do not find significant impacts of attrition on estimated coefficients for the set of outcomes we consider (participation in groups).

The second wave of data collection began in April 2004 and ended in July 2004. In this wave, the survey team interviewed any household formed by children who no longer live in their origin *barangays*.[3] 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, the major metropolitan area in northern Mindanao) as well as many households in *poblaciones* (municipality seats) 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. Figure 2 presents a map of the survey area and the locations of original households, households formed by children in the original *barangays*, and households formed by children who migrated. 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). The analysis in this paper is based on 305 of the 311 parent households for whom we have complete data.

[3] Historically, *barangays* are relatively small communities of 50 to 100 families. Most villages have 30 to 100 houses and the population varies from 100 to 500 persons (Constantino, 1975).

Figure 2. Sampled child and village household counts

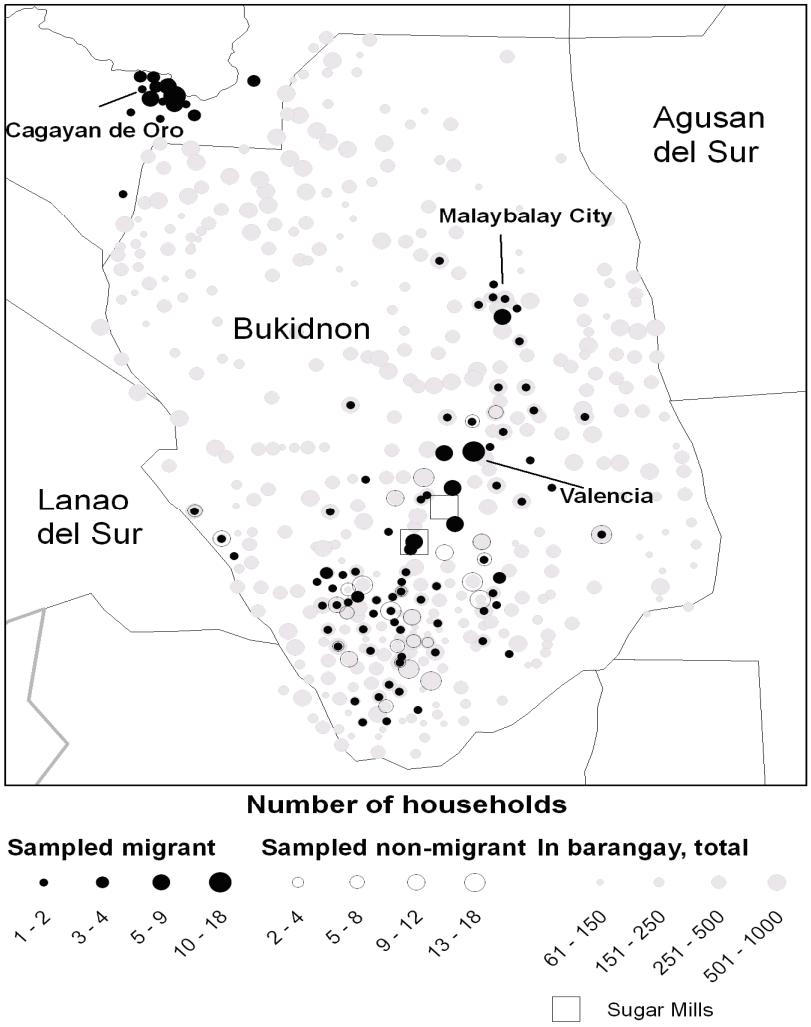

Table 1 presents selected household characteristics of parents who were re-interviewed in 2003. The household head was 55 years old in 2003. Reflecting changes over the life-cycle, household sizes have decreased from 6.8 persons in 1984 to 5.8 in 2003, and dependency ratios have markedly decreased from 1.66 to 0.49. Agriculture seems to have become less important to parents as they aged: while 91 percent of parent households were engaged in agricultural production in 1984, only 71 percent remain active in agriculture, many of them having divested themselves of land. Only 33 percent of parent households had no land in 1984 (whether owned or rented), whereas 61 percent of parent households no longer have owned or cultivated land in 2003. This should not be interpreted as impoverishment of parent households since parents typically bestow land to children when the latter marry, not when the parents die. The average area cultivated in 1984 was 3.17 hectares; in 2003, the number was 3.09 hectares.

Table 1. Characteristics of parent households, 1984 and 2003[4]

	Parent households n=305	
	Mean	**Standard deviation**
Age of the household head		
Age in 1984	36.31	8.19
Age in 2003	54.67	7.63
Years of schooling of head		
Years of schooling in 1984	5.73	3.14
Years of schooling in 2003	6.12	6.07
Household size		
Household size in 1984	6.83	2.44
Household size in 2003	5.84	2.74
Dependency ratio		
Dependency ratio in 1984	1.66	0.84
Dependency ratio in 2003	0.49	0.62
Proportion of agricultural households		
Proportion of agricultural households in 1984	0.91	0.28
Proportion of agricultural households in 2003	0.71	0.45
Proportion with no land		
Proportion with no land in 1984	0.33	0.47
Proportion with no land in 2003	0.61	0.49
Area cultivated		
Area cultivated in 1984 (hectares)	3.17	4.07
Area cultivated in 2003 (hectares)	3.09	7.27

3. SHOCKS IN BUKIDNON, PHILIPPINES.

We define shocks as adverse events that lead to a loss of household income, a reduction in consumption, a loss of productive assets, and/or serious concern/anxiety about household welfare. Similar to the Ethiopia case study (Dercon et al., 2008), data used in this section are based on a household-level "shocks" module developed in Hoddinott and Quisumbing (2003). The module asks households to consider a list of adverse events and indicate whether the household was adversely affected by them.

[4] Note: Descriptive statistics based on 305 parent households in the regression sample and 261 children living in the same communities.

Shocks are divided into a number of broad categories: agroclimatic, economic, political/social/legal, crime, and health. Agroclimatic shocks include drought and flooding, but also erosion and pestilence affecting crops or livestock. Economic shocks include problems in terms of access to inputs (both physical access and large increases in price), decreases in output prices, and difficulties in selling agricultural and nonagricultural products. Political/social/legal shocks in the Philippines include the implementation of land reform (its coverage was expanded beyond rice and corn areas in 1987) and an uncertain peace and order situation due to military conflict, as well as contract disputes.[5] Crime shocks include the theft and/or destruction of crops, livestock, housing, tools or household durables as well as crimes against persons. Peace and order shocks include perceptions of general crime risk and military activity. Health shocks include both death and illness. We also consider miscellaneous shocks such as conflicts and disputes with other family members, neighbors, or other village residents regarding access to land or other assets. Finally, in addition to these questions about specific shocks, households were also asked to enumerate the three most important adverse shocks that they had experienced over the past 18 years. These are summarized in Table 2.

Table 2. Household self-reports of the worst shocks experienced between 1984-2003, Bukidnon, Philippines

	Parent households in regression
Drought	38.7
Crop pests and diseases	27.5
Illness or disability of head, spouse, other person (including hospitalization)	31.8
Death of head, spouse, other person	23.6
Other weather (humidity, floods, winds, fires)	13.8
Crime/peace and order	12.8
Input shocks (lack of financing, high input process)	7.5
Livestock disease and deaths	5.6
Political shocks (property rights and contract disputes)	5.3
Divorce and abandonment	2.0
Output shocks (lack of demand for output) and unemployment	1.6
Number of households	305

The proportion of households reporting shocks is sizeable. Eighty-eight percent of parent households in the Philippines reported a most important shock, 52 percent a second most important shock, and 15 percent a third most important

[5] Land reform would be an adverse event for landowners who lose land to the program and a positive event to beneficiaries. However, the implementation of the program did create uncertainty regarding property rights, which eventually affected investment decisions.

shock. Drought is the most important shock reported by parents (38.7 percent reporting), followed by illness or disability (31.8 percent) and crop pests and diseases (27.5 percent). Death of a spouse or other household member is also important—it is mentioned by 23.6 percent of households. Parent households also report other weather-related factors (humidity, floods, high winds, fires) (13.8 percent) as well as crime and peace and order shocks (12.8 percent) as among their worst shocks. Because shocks reporting may be subject to respondent bias (for example, wealthier people have more assets that can be stolen, and thus may be more likely to report theft and crime shocks, or have more livestock that can be affected by diseases), in the empirical work we use village-level measures of most shocks, except for illness and death shocks, for which we use household-level reports.

4. SHOCKS IN THE RURAL PHILIPPINES: AN ECONOMETRIC ASSESSMENT

While the discussion in Section 3 provides a detailed overview of the types of shocks experienced by households, it does not give us a quantitative sense of their consequences, nor if these consequences vary depending on wealth, schooling, and other observable household characteristics. For these reasons, we report an econometric assessment of the impact of these shocks on one measure of welfare, log per capita consumption.[6]

Log of per capita consumption (lnpcexp) of household *i* in village *v* in time *t* is a function of two broad sets of household characteristics: household characteristics observed in the past (time t-1) (Hiv, t-1) and shocks to households experienced between time t-1 and time t(Siv, t). Vectors of parameters to be estimated are γ, β, and κ. The dependent variable is measured in 2003, while regressors are 1984 values of household characteristics. Denoting εiv, t as the white noise disturbance term, we write this relationship as

$$\text{lnpcexp}_{iv,t} = \gamma \cdot H_{iv,t-1} + \beta \cdot S_{iv,t} + \kappa \cdot X_{iv,t} + \varepsilon_{iv,t} \quad (1)$$

Observable household characteristics are characteristics of the head (age, sex, and schooling), demographic household characteristics (log size and dependency ratio), and household wealth. We do not include sex of the household head in the regressions because none of the households were female-headed in 1984. Household wealth is proxied by area cultivated in hectares and the value of

[6] The consumption variable is constructed in the following fashion. Food and nonfood consumption were covered in separate modules in the questionnaire. For each food item, households were asked about the amounts they had consumed out of purchases, consumption out of own stock, and consumption from gifts and wages in-kind in the last week. With the exception of consumption of own produce and gifts, which were valued using prices obtained from local market, surveys fielded at the same time as the household survey; expenditures on purchased food were reported as is. Nonfood items are limited to non-investment goods so that we include consumables such as matches, batteries, soap, kerosene and the like, clothing, and transport but exclude investments in durable goods such as housing. Different recall periods were used for different items; for comparability all are changed into weekly (seven-day) consumption and expressed in per capita terms.

net worth. Dummy variables for the head being Catholic (the dominant religious group) and having been born in Misamis Oriental are included. Having been born in Misamis Oriental, where the region's metropolitan center is located, may indicate better connections for business and commerce. Dummy variables are included for each municipality in the Philippines. The implication is that shocks are identified by within-municipality variation, which may make identification of covariate shocks difficult. Nevertheless, while covariate shocks are found in virtually all municipalities, there is no single municipality where drought affected all households unilaterally. Both factors appear to allow identification of the impact of these relatively covariate events in our data. These consumption regressions are estimated using ordinary least squares (OLS); note that while we have longitudinal data, we use past values as control variables instead of estimating a panel data model.

The shocks data consist of dummy variables on each type of shock reported by each household, such as whether the household experienced drought, and therefore do not indicate the severity of the shock. To minimize respondent bias and to obtain some indicator of severity of shocks, we aggregate common shocks in the following categories by using the percentage of households in the village affected by: a drought; too much rain, pests or diseases that affected field crops or crops in storage; pests or diseases that affected livestock; difficulty in obtaining inputs or increases in input prices; inability to sell or decreases in output prices; and peace and order problems. We use the more general "peace and order" problems instead of crime and theft shocks, since the latter is more likely to be tainted by respondent bias. Illness and death shocks are disaggregated into illness of the head/spouse, illness of another household member, death of the head/spouse, and death of another household member.

Table 3 presents regression results showing the impact of shocks and other covariates on log consumption per capita in Bukidnon, Philippines, controlling for household characteristics in 1984, and disaggregating on the basis of landholdings, net worth, and years of schooling in 1984. The percentage of households affected by drought—henceforth a drought shock, for brevity—decreases per capita consumption by 11 percent for all households. However, it is clear that the impact of shocks differs greatly across types of households.

Table 3. Impact of shocks on log consumption per capita, 2003, Bukidnon, Philippines, parent households, n=350[7]

	All households		No land in 1984		Had land in 1984		Below median landsize, 1984		Above median landsize, 1984		Below mediannet worth, 1984		Above median net worth, 1984		Below median schooling, 1984		Above median schooling, 1984	
	Coeff	**t**	**Coeff**	**t**	**Coeff**	**t**	**Coeff**	**t**	**Coeff**	**t**	**Coeff**	**t**	**Coeff**	**t**	**Coeff**	**t**	**Coeff**	**t**
Shocks between 1984-2003																		
Percent of households in village affected by																		
Drought	-0.11	-1.92**	-0.14	-1.38	-0.10	-0.90	-0.20	-3.90***	-0.03	-0.44	-0.16	-2.28**	-0.04	-0.38	-0.05	-0.32	-0.27	-5.81***
Excessive rain or flooding	0.10	1.38	0.06	0.60	0.05	0.43	0.12	1.67*	-0.01	-0.07	-0.08	-1.54	0.12	0.68	-0.19	-0.67	0.20	1.60
Crop/livestock pests/diseases	0.04	1.18	-0.13	-3.15**	0.11	2.71***	-0.10	-3.98***	0.10	2.73***	-0.06	-1.26	0.12	2.70***	0.08	1.95*	0.03	0.74
Input shocks	0.03	0.09	1.17	3.03***	-0.41	-0.50	0.45	1.24	-0.35	-0.63	0.28	1.09	-0.56	-0.75	-0.96	-2.86***	1.27	3.60***
Output shocks	0.16	1.04	0.32	1.36	0.10	0.48	0.05	0.33	0.11	0.31	0.23	0.90	0.22	1.23	0.23	0.56	-0.09	-0.52
Peace and order problems	-0.04	-0.54	-0.01	-0.05	-0.04	-0.19	0.05	0.52	-0.25	-0.87	0.15	0.88	-0.20	-0.73	0.30	0.63	-0.13	-1.31
Idiosyncratic shocks																		
Death of head or spouse	-0.07	-0.67	0.35	1.24	-0.20	-2.11**	0.33	1.43	-0.30	-3.80***	-0.14	-0.85	-0.11	-1.03	-0.18	-1.49	0.03	0.18
Death of another person	0.08	0.97	0.43	3.52**	0.01	0.04	0.19	1.64	0.01	0.04	0.13	1.28	-0.06	-0.56	0.09	0.87	0.08	0.60
Illness of head or spouse	0.18	1.39	-0.04	-0.25	0.27	1.46	-0.03	-0.27	0.36	1.42	0.05	0.50	0.08	0.36	0.06	0.66	0.36	1.60
Illness of another person	0.10	1.45	-0.02	-0.11	0.09	0.71	0.09	0.52	0.20	1.29	-0.01	-0.07	0.27	1.38	0.10	0.83	0.11	0.88

[7] Notes:

Regressions included control variables as of 1984: log of age of the household head, years of schooling of the head, log of household size, dependency ratio, net worth, area cultivated, whether household head was Catholic, and whether the head was born in Misamis Oriental.

Standard errors are calculated using the Huber-White method; municipality dummies are included but not reported. A constant term was estimated but not reported.

*Significant at the 10% level

**Significant at the 5% level

***Signficant at the 1% level

Whether or not a household had land in 1984 refers to whether they had either owned or rented land

Median land size in 1984 was 1.75 hectares

Median net worth in 1984 was 7,580 pesos

Median years of schooling of the household head in 1984 was 6 years

Drought shocks have the greatest impact on households whose landholdings are below the median land size and households with below median net worth of assets, and surprisingly, on households with greater than median levels of schooling. Crop and livestock pests and diseases significantly reduce consumption of households without land in 1984 and households with landholdings below the median size, but increase consumption of households with land, households with above median landholding size, and households with above median net worth. Input shocks reduce per capita consumption of those with less than median schooling, but increase it for those with above median schooling and those with no land in 1984. It is possible that these households are less likely to be engaged in agriculture and are in fact net suppliers of labor (in the case of those with no land) and other inputs (for those with above median schooling, who could be engaged in nonagricultural occupations). Output shocks do not appear to affect per capita consumption significantly.

Death and illness are shocks that are truly idiosyncratic. Both death and illness are disaggregated depending on whether death (illness) occurred for the household head or spouse, or for another household member. We find that death of the head or spouse significantly reduces log consumption per capita for households that had land in 1984 and for households above the median landholding size in 1984. Households who have more land were probably engaged in agricultural production, so their consumption is more vulnerable to the loss of an adult working member, particularly either the head or spouse. In contrast, death of another person increased per capita consumption for households without land. This may simply be an artifact of construction of the dependent variable—death reduces household size and therefore the denominator of the dependent variable. Illness did not significantly affect consumption on the aggregate and across household types.

The above analysis does not allow one to examine whether shocks have long-term and persistent impacts. Because the interval between survey rounds is close to twenty years, one would expect substantial heterogeneity of impact across such a long time period. To account for the possibility that timing of shocks matters, we divide our shocks recall period into two intervals: the first interval, 1984-1996, corresponds to the period before the most recent El Nino event and the Asian economic crisis (1997-1998), while the second interval, 1997-2003, includes the recent El Nino and the period of the Asian economic crisis and recovery. A drought shock also occurred in the earlier interval, in 1987-88.

Table 4 presents regressions on log per capita consumption, with shocks disaggregated into the two intervals, before and after the recent El Nino and the Asian economic crisis. Similar to Table 3, these regressions include controls for age and education of the household head, household size, dependency ratio, whether the head was Catholic, and whether he or she was born in Misamis Oriental. In the regression for all households, the 1987-1988 drought had a larger and more persistent negative impact than the recent drought, indicating that drought response mechanisms may have improved in recent years.

Table 4. Impact of shocks by timing of shock and by household characteristics on (log) consumption per capita, Bukidnon, Philippines, 2003, parent households only (n=350)

	All households		No land in 1984		Had land in 1984		Below median landsize, 1984		Above median landsize, 1984		Below median net worth, 1984		Above median net worth, 1984		Below median schooling, 1984		Above median schooling, 1984	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t	Coeff	t	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Shocks between 1997-2003																		
Percent of households in village affected by:																		
Drought	0.00	-0.16	0.01	0.15	-0.03	-0.80	-0.01	-0.20	-0.08	-3.36***	0.01	0.23	-0.03	-0.59	0.01	0.21	-0.04	-1.03
Excessive rain or flooding	0.01	0.33	0.08	0.45	0.07	0.92	0.06	0.58	0.06	0.71	0.05	0.94	0.10	0.94	-0.25	-1.89*	0.07	0.63
Crop/livestock pests/diseases	0.02	0.85	0.03	0.55	0.03	0.62	-0.05	-1.01	0.07	1.29	0.03	0.78	0.03	0.55	0.09	1.65*	0.00	-0.04
Input shocks	-0.05	-0.44	(dropped)		-0.56	-2.91***	0.06	0.16	-0.94	-4.52***	0.05	0.18	-0.62	-2.38***	-0.60	-1.39	0.78	3.53***
Output shocks	0.03	0.26	-0.30	-1.79*	-0.05	-0.82	-0.25	-3.59***	0.21	1.52	-0.30	-2.65***	-0.12	-0.21	-0.21	-0.83	0.03	0.18
Peace and order problems	-0.23	-1.07	-0.47	-1.46	-0.70	-2.92***	0.08	0.31	-1.03	-3.53***	0.07	0.18	-0.87	-2.33***	-0.33	-0.51	0.42	1.26
Idiosyncratic shocks																		
Death of head or spouse	-0.04	-0.28	0.45	0.93	-0.18	-1.16	0.37	1.06	-0.25	-2.69***	-0.27	-0.89	-0.02	-0.14	-0.20	-1.63	0.07	0.30
Death of another person	0.05	0.52	0.53	2.50**	0.09	0.49	0.21	1.30	-0.10	-0.41	0.25	1.86*	0.03	0.11	0.04	0.27	0.07	0.38
Illness of head or spouse	0.07	0.56	-0.04	-0.22	0.16	0.97	-0.13	-0.61	0.26	1.22	0.04	0.26	-0.13	-0.49	-0.06	-0.53	0.17	0.56
Illness of another person	0.03	0.29	-0.33	-1.25	0.10	0.67	0.05	0.27	0.12	0.65	-0.16	-1.82*	0.24	1.10	0.05	0.29	0.03	0.21
Shocks between 1984-1996																		
Percent of households in village affected by:																		
Drought	-0.11	-3.79***	-0.14	-3.52***	-0.12	-1.54	-0.17	-6.30***	0.02	0.59	-0.11	-2.81***	-0.05	-0.97	-0.01	-0.07	-0.23	-2.85***
Excessive rain or flooding	0.12	1.70	0.00	-0.04	0.08	0.62	0.19	3.24***	-0.16	-1.03	-0.04	-0.46	0.23	0.87	-0.10	-0.71	0.14	0.63
Crop and livestock pests and diseases	-0.01	-0.27	-0.29	-2.23***	0.06	0.93	-0.10	-1.07	0.03	0.35	-0.20	-3.91***	0.08	1.06	-0.03	-0.42	0.03	0.35
Input shocks	0.05	0.52	0.54	4.70***	-0.64	-1.35	0.66	1.97**	-0.79	-3.92***	0.29	1.33	-0.44	-0.72	-0.63	-1.67*	1.05	1.81*
Output shocks	0.07	0.74	0.15	0.94	-0.02	-0.08	0.02	0.26	-0.37	-1.79*	0.12	1.20	0.02	0.16	0.00	-0.01	0.01	0.06
Peace and order problems	-0.02	-0.23	0.03	0.11	0.13	0.71	-0.06	-0.25	0.32	1.50	0.15	0.86	-0.02	-0.06	0.36	1.72*	-0.13	-1.31
Idiosyncratic shocks																		
Death of head or spouse	-0.09	-0.82	0.08	0.40	-0.15	-1.10	0.38	1.38	-0.28	-2.61***	-0.05	-0.42	-0.17	-1.49	-0.14	-0.88	-0.01	-0.03
Death of another person	0.10	0.61	0.58	3.41***	-0.03	-0.11	0.14	1.01	0.04	0.19	0.20	1.74*	-0.09	-0.42	0.11	0.83	0.03	0.11
Illness of head or spouse	0.33	1.72*	-0.21	-0.75	0.34	1.11	0.24	2.21**	0.58	1.82*	-0.02	-0.16	0.36	1.50	0.15	0.74	0.63	2.23**
Illness of another person	0.18	1.45	0.49	4.91***	-0.03	-0.14	0.20	0.94	0.15	0.58	0.15	1.00	0.35	0.97	0.15	1.10	0.10	0.62

Notes:

Regressions included control variables as of 1984: log of age of the household head, years of schooling of the head, log of household size, dependency ratio, net worth, area cultivated, whether household head was Catholic, and whether the head was born in Misamis Oriental.

Standard errors are calculated using the Huber-White method; municipality dummies are included but not reported. A constant term was estimated but not reported.

*Significant at the 10% level

**Significant at the 5% level

***Significant at the 1% level

Whether or not a household had land in 1984 refers to whether they had either owned or rented land

Median land size in 1984 was 1.75 hectares

Median net worth in 1984 was 7,580 pesos

Median years of schooling in 1984 was 6 years

Not surprisingly, short- and longer-term impacts differ across household types. Similar to the results for all households, in almost all cases, the 1987-1988 drought had a stronger impact compared to the 1997-1998 drought. The impact of the 1987-1988 drought was felt most strongly by households with no land in 1984, households with less than median landholdings, households with less than median net worth, and households with greater than median schooling. Crop and livestock pest and disease shocks experienced in the earlier period also had a more lasting impact on households without land and households with less than median net worth. Input shocks, however, significantly reduced per capita consumption significantly in both the later and earlier periods. Not surprisingly, the burden of input shocks in both periods was felt by households with land, those with greater than median land size, and those with greater than median assets, since these households are more likely to be engaged in agriculture. In contrast, a higher percentage of households reporting input shocks is associated with higher per capita consumption among households with no land, households with less than median land size, and households with greater than median schooling. These households are less likely to be agricultural producers and may in fact be net suppliers of labor or other farm inputs (in the case of those with greater than median schooling). Output shocks tended to have negligible impact in the earlier period, but had significant recent impacts on households without land, households with less than median landholdings, and households with less than median net worth. Peace and order problems had a significant impact in recent years, adversely affecting households with land, with greater than median landholdings, and greater than median net worth. Finally, among the idiosyncratic shocks, death of the head or spouse had a strong negative impact, regardless of whether it occurred in the later or earlier period. The seeming positive impact of illness on log per capita expenditures can be attributed to increased medical expenditures.

5. GROUPS AND NETWORKS IN BUKIDNON, PHILIPPINES

In this section, we describe the groups and networks observed in Bukidnon, Philippines (see Godquin and Quisumbing, 2006, 2007 for a more detailed exposition) and analyze the factors that influence group and network formation. As mentioned above, we use “groups” to refer to more formal and structured organizations and “networks” to denote more informal alliances. Respondents in the 2003 round of the Philippine survey were asked about formal groups and informal networks to which they belonged. The group membership module asked the household members to list all the groups, associations, and cooperatives at least one household member belonged to. Households provided information on a total of 689 groups, which were classified into production, credit, burial, religious, and civic groups. As a measure of social networks, households were also asked about the number of persons it can run to for help on specific occasions. These events mobilize different aspects of social capital, such as trust, mutual insurance, information-pooling, or copying. Trust-related questions dealt with care of the house, care of children, and family problems, while questions related to economic networks were related to networks for coping with economic loss, price information, and technology adoption. These questions were informed by discussion with Filipino

researchers who were familiar with the local culture and field tested by the authors.[8]

Table 5. Formal and informal networks of parent households, by 1984 asset quartile, Bukidnon, Philippines, 2003

	All parent households	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Formal groups					
Proportion of households participating in groups	0.76	0.56	0.75	0.80	0.84
Total number of groups the household belongs to	1.57	1.00	1.41	1.53	2.05
Proportion of households with at least one member in a group					
Production groups	0.27	0.06	0.14	0.30	0.46
Credit groups	0.21	0.15	0.19	0.21	0.27
Burial groups	0.31	0.27	0.29	0.34	0.33
Religious groups	0.34	0.29	0.41	0.34	0.30
Civic groups	0.15	0.13	0.18	0.09	0.19
Networks					
Proportion of households with at least one person in a network					
All networks	1.00	1.00	1.00	1.00	1.00
Specific networks					
Care of house	0.53	0.52	0.48	0.50	0.60
Family problems	0.58	0.44	0.65	0.56	0.62
Child care	0.52	0.51	0.48	0.50	0.59
Economic loss	0.75	0.71	0.73	0.70	0.82
Price information	0.69	0.75	0.62	0.65	0.75
Technology adoption	0.48	0.55	0.40	0.44	0.54
Total number of persons in the household's network[9]	13.21	11.23	11.97	13.21	15.32
Size of specific networks (number of persons)					
Care of house	1.79	1.60	1.75	1.72	2.00
Family problems	2.33	1.81	2.19	2.50	2.56
Child care	1.66	1.54	1.66	1.68	1.73
Economic loss	3.38	2.79	2.89	3.06	4.41
Price information	2.40	2.29	1.93	2.49	2.68
Technology adoption	1.80	1.64	1.68	1.72	1.98

[8] See Godquin and Quisumbing (2006) for details and the exact wording of the questions.

[9] Defined as the sum of persons across all networks.

Households in the Philippines can count on various social and economic networks for support (see Table 5). Membership in groups is widespread, with 76 percent of parent households belonging to at least one group. Parent households belong to an average of 1.6 groups, with the proportion of households belonging to at least one group and the average number of groups to which the household belongs increasing steadily with asset quartile.

The types of groups households belong to are quite diversified compared to other countries where the most important groups are village women's and/or men's groups that engage in diversified activities (like in Senegal or in Kenya—see Kariuki and Place, 2005).[10] Religious groups are the most frequently mentioned groups, with 34 percent of the households belonging to at least one religious group. Civic groups are the least common type of group, with 15 percent of the households belonging to at least one such group. Household participation in religious, burial, and civic groups increases across asset quartiles, even though not steeply, but participation in production and credit groups increases markedly as wealth increases. This suggests that wealth may be a greater barrier to participation in economic versus non-economic groups.

Households also belong to a number of diverse networks, dealing with social and economic matters. Table 5 presents information on the various networks households can rely on for help in specific matters. The "all networks" variable is the sum of persons in all of the household's networks and could potentially overstate the size of the total network since it is possible that the same person may belong to more than one trust-based network.[11] Across quartiles, virtually all households reporting having at least one person they can turn to for help for various matters, although this may be an artifact of the definition of this variable. Looking at various types of networks, 75 percent of households report having a network to turn to in case of economic loss, with the highest asset quartile the best insured with respect to economic loss (82 percent of households report being able to turn to someone in case of severe economic losses, in contrast to 71 percent of households in the lowest quartile). Only 48 percent of households report having a network for technology adoption and copying—perhaps because farmers tend to rely on the formal extension system rather than their neighbors for information on new technologies. The study site is near an agricultural university that has active extension programs; also, the Department of Agriculture's extension agents have regular technology dissemination activities. On average, the number of persons households can turn to in case of important economic loss is larger than for the other scenarios.

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[10] Godquin and Quisumbing (2006) investigate the determinants of men's and women's participation in groups. They find that while men and women have equal probabilities of participating in groups and belong to the same number of groups, men tend to belong to productive and burial groups, and women to civic and religious groups.

[11] Unlike in Ethiopia, we did not ask households to name the persons in their network, so we could not check whether the same person belonged to different types of networks.

Table 6. Determinants of the total number of groups, 2003[12]

	Tobit	
	All groups	
	Coeff	**t**
Age of the household head. 2003	-0.015	-0.09
Age squared	0.000	0.14
Whether head completed secondary schooling (10 years or more)		**2.92**
% household members with >=6 years of schooling, 1984		**2.78**
Log of household size in 1984	0.283	0.89
Dependency ratio in 1984	0.045	0.29
Asset quartile in 1984, highest excluded		
Lowest asset quartile	-0.825	**-2.23**
Second asset quartile	-0.692	**-2.50**
Third asset quartile	-0.786	**-3.15**
Whether agricultural producer in 1984 (a)	-0.169	-0.59
Whether household had a nonagricultural business, 1984	0.083	0.40
Head is Catholic, 1984	0.743	**2.28**
Distance to *poblacion* (town center), in km	-0.186	**-5.59**
Number of shocks, 1984-2002	0.134	**1.99**
Barangay-level variables		
Origin heterogeneity	0.682	0.82
Ethnic heterogeneity	-1.596	**-3.15**
Asset heterogeneity	-0.759	**-3.22**
Education heterogeneity	-2.436	**-1.89**
Percent households affected by peace/order problems	0.004	**1.86**
Programs operating in barangay, 2000-2001		
Cooperatives	-0.674	**-3.31**
Nongovernmental organizations	-0.159	-0.85
Government organizations	0.061	0.44
Mean of total value of non-land assets, 1984, household excluded	-0.002	-1.38
Constant	3.829	0.83
Sigma	1.462	**20.85**
Number of observations	311	
Left-censored observations	75	
Uncensored observations	236	
Wald chi2(23)	142.62	
Prob > chi2	0	
Pseudo R2	0.1281	

[12] Notes: z-values and t-statistics in bold are significant at 10 percent or better.

While it might seem that membership in groups and the size of one's networks increase with asset ownership, these differences in means might also arise from characteristics of households that also affect their propensity to join groups. Thus, we explore the determinants of group membership and network size using econometric analysis. We investigate the impact of household physical and human capital as well as various aspects on village heterogeneity on membership in groups and networks, controlling for individual, household, and community characteristics. Among the community characteristics of interest are measures of heterogeneity at the village level, following Alesina and La Ferrara (2000). These are measures of ethnic, origin, education, and asset heterogeneity. We also include (from the community questionnaire) the cumulative proportion of households affected by peace and order problems since 1984, and programs operating in the *barangay* the previous year (2000-2001).

Table 6 presents a tobit regression of the determinants of the total number of groups that a household belongs to. Both human capital and physical capital of the households are strongly associated with the accumulation of formal social capital. Whether the head completed secondary schooling and the percentage of household members with greater than primary schooling positively and significantly affect the total number of groups to which the household belongs. Relative to the highest asset quartile, household belonging to the lower asset quartiles belong to fewer groups. Catholic households also belong to more groups, a result that is driven by membership in religious groups. Not surprisingly, distance from the town center reduces the total number of groups to which the household belongs. Households that experienced more negative shocks in the past also belong to more groups, possibly indicating that groups may perform an insurance function.

Group membership is lower in villages with higher ethnic diversity and higher asset heterogeneity, while education heterogeneity has a weak negative effect. Political unrest has a weak positive impact on the number of groups the household belongs to, while the number of cooperatives has a strong negative effect. The unexpected impact of cooperatives on the number of groups can be explained by the negative reputation of the cooperatives movement in the Philippines. Cooperatives have often been formed for political purposes, as the cooperatives movement in the Philippines has risen and fallen depending on support from government officials.[13]

We also examine the determinants of participating in specific groups; detailed results are reported in Godquin and Quisumbing (2007). Consistent with the results for group membership in total, wealthier households are more likely to take part in productive groups. Not surprisingly, households engaged in agricultural or nonagricultural production are more likely to be members of productive groups, with being an agricultural producer having a greater marginal impact. Interestingly, none of the measures of village-level heterogeneity have a significant impact on membership in productive groups. The household's position in the asset distribution

[13] Cooperatives were encouraged during the Marcos regime, for example, especially for agrarian reform beneficiaries. Many of these cooperatives fell into disarray in subsequent years. The cooperatives movement paled in comparison to the rise of NGOs during the Aquino administration, but seems to have recovered with support from the Ramos administration.

also has a significant impact on the probability of joining a credit group, with the second and third asset quartiles significantly less likely to join a credit group relative to the wealthiest quartile. Both ethnic and educational heterogeneity have a negative impact on participation in credit groups. It is possible that having a similar level of education is a precondition for being able to rely on other group members to manage money together, or having similar ethnic backgrounds enables group members to form and manage groups more efficiently. We find that group participation declines in villages with more cooperatives. Perhaps the high number of cooperatives operating in the village is a signal of coordination difficulties. It is also possible that because members of cooperatives can avail of credit from the cooperative, they do not feel the need to participate in stand-alone credit groups. Lastly, a high incidence of peace and order problems diminishes participation in credit groups, perhaps due to increased uncertainty.

Burial groups are important risk-sharing institutions in the rural Philippines and are found in almost all Philippine communities. In comparison to production and credit groups, being less wealthy does not seem to pose a significant barrier to participation in both burial and religious groups. Indeed, participation in burial groups is higher in *barangays* with a lower average value of non-land assets, possibly because households in poorer communities, which may not have the resources to independently finance burial expenses, have a greater incentive to participate in such groups. Participation in burial groups also crosses occupational categories, with households in different occupational categories having no significant difference in participation. Catholics are more likely to take part in burial groups. Village heterogeneity dampens the desire to join burial groups: ethnic and asset heterogeneity have a negative significant impact on the probability of joining a burial group. A higher incidence of peace and order problems increases the likelihood of joining burial groups. Even if peace and order problems do not directly affect the mortality rate of the village, they can increase residents' perception of uncertainty and their desire to insure against adverse events.

Compared to production, credit, or burial groups, religious and civic groups do not focus on economic motives. Nevertheless, households with more human capital are more likely to participate in religious and civic groups. Interestingly, participation in religious groups does not differ across asset quartiles. Origin heterogeneity weakly reduces participation in civic groups, some of which are organized around different regional groupings (for example, a Boholano group, composed of migrants from Bohol), but ethnic heterogeneity increases the probability of joining a civic group.

Does participation in formal groups substitute for informal trust-based networks? Group membership can both increase the size of one's network and be facilitated by one's network if members of networks have better access to information or if membership in one group is restricted to acquaintances of current group members. Alternatively, membership in formal groups could substitute for informal networks if households turn to formal institutions to provide services—e.g., risk-sharing, credit, insurance—that were formerly provided through one's informal social network. To investigate this issue, we estimate a regression on the size of a household's network, defined as the sum of the number of persons that a household can run to for help. As mentioned above, this variable may overestimate the number of persons who can actually assist a household, since it would double-

count persons who provide help in different ways. To address the issue of double counting, we also estimate regressions separately for each type of network, but report the results only for total network size here.

Table 7. Determinants of the sum of all networks[14]

	Sum of all networks			
	OLS		IV	
Variables	**Coeff**	**z**	**Coeff**	**z**
Number of groups in 2003 (endogenous in IV)	0.015	0.07	0.080	0.13
Age of household head	0.121	1.22	0.116	1.23
Education of head in 1984	0.394	**2.61**	0.391	**2.12**
Log of household size in 2003	0.286	0.18	0.236	0.16
Percentage of household members in 2003:				
Aged 0 to 14	0.295	0.13	0.603	0.28
Aged 15 to 19	-1.148	-0.45	0.988	-0.42
Aged 55 and over	2.706	1.01	2.873	1.18
Total asset value in 1984	0.008	**1.99**	0.008	**2.24**
Other household characteristics				
Number of shocks, 1985-2003	0.465	**1.65**	0.470	**1.67**
Indices of barangay heterogeneity				
Origin hetetoregeneity	1.718	0.46	1.656	0.39
Asset heterogeneity (1984)	-2.004	-1.14	1.632	-0.83
Ethnicity of the household head	0.001	0.64	0.001	0.76
Education of the household head	0.115	0.29	0.068	0.18
Location of children living outside the household				
Number of daughters living outside village	-0.539	**-2.15**	0.538	**-2.09**
Number of daughters living in the village	0.060	0.09	0.105	0.16
Number of sons living outside the village	-0.214	-0.70	0.206	-0.68
Number of sons living in the village	0.925	1.38	0.866	1.34
Constant	1.672	0.24	1.902	0.28
Number of obs	304		304	
F(17, 29)	7.36		8.26	
Prob > F	0.00		0.00	
Centered R2	0.13		0.13	
Uncentered R2			0.79	
Root MSE	7.20		6.98	
Test of exogeneity: H0: Regressor is exogenous				
Wu-Hausman F test (p-value_			0.022	0.88
Durbin-Wu-Hausman chi-square test (p-value)			0.023	0.88

[14] Notes: Regressions estimated with attrition weights; standard errors robust to clustering within *barangays*; z-values in bold indicate significance at 10 percent or better.

Instrumental variables diagnostics		
Shea partial R-2 test (F, p-value)	15.90	0.00
Anderson identification/IV relevance test (Chi-2, p-value)	59.77	0.00
Hansen-J statistic (overid test) (Chi-2, p-value)	9.71	0.21

Household network density can be modeled as a function of household characteristics and village-level attributes. Household characteristics include the age and education level of the household head, household size, household demographic composition, asset position, and the number of shocks experienced since 1984. Because personal relationships may affect network formation more than economic considerations (Fafchamps and Gubert, 2007), we include measures of kinship relationships within and outside the village: the number of sons and daughters living inside and outside the village. We also include the measures of village-level heterogeneity described above.

An underlying question is whether participation in groups increases network-based social capital. We treat participation in groups as endogenous, using as instruments variables that affect whether households join groups, but which do not affect the size of the network. These variables are whether the household is a sugar producer, whether the head was Catholic in 1984, *barangay* heterogeneity indices in 1984, per capita expenditures on groups in 1984, and the *barangay* mean number of groups, excluding the household. Both OLS and instrumental variables estimates, in which group membership is treated as endogenous, are presented in Table 7; exogeneity tests lead us to accept the null hypothesis that the number of groups is exogenous.

Surprisingly, the total number of groups to which a household belongs does not affect the density of its networks. Human capital and physical capital contribute to the size of social networks: education of the household head and total asset value in 1984 both have positive and significant coefficients. There is some weak indication that networks perform a risk-smoothing function, since the number of shocks experienced since 1984 increases the number of persons that one can turn to for help. Interestingly, the number of daughters living outside the villages exerts a strong negative influence on the size of one's local trust-based networks.

Do these results hold for different types of networks? Regressions not reported here examine the determinants of the size of three different types of social networks (care of house, family problems, and childcare) and three types of economic networks (networks related to economic loss, price information, and technology information), with the number of groups as one of the regressors (treated as endogenous). What is remarkable in all these regressions is that the number of groups is almost always insignificant, indicating that the number of groups a household belongs to does not significantly impact the formation of social and economic networks. Unlike the regressions on group membership, very few variables related to the economic status of the household are significant in the economic network variables. Households that are wealthier, as indicated by total asset value in 1984, are slightly more likely to have larger networks that insure against economic loss, while asset heterogeneity of the *barangay* reduces the size of these networks. Networks for price information may be driven by risk-pooling considerations, with households experiencing more negative shocks since 1984

having larger networks for price information. However, a striking finding, similar to the findings of Fafchamps and Gubert (2007), is the importance of pre-existing personal relationships as drivers of economic trust-based networks. Networks related to price information and new technologies are smaller, the larger the number of daughters living outside the village. The network for new technologies, however, is positively associated with the number of sons living inside the village, but in separate households.

Our findings suggest that sons and daughters perform different functions in social and economic networks—a finding that can be traced to the different roles of men and women in Filipino society. Daughters are trained to be responsible and often play the role of insurers, migrating to towns and cities and then sending remittances to their origin households (Lauby and Stark, 1988). The number of daughters living outside the village negatively affects the combined number of persons in all networks and the number of people in price-information and technology-adoption networks. Perhaps daughters living outside the village are a reliable source of information about price trends and new technologies. In contrast, sons who are living in separate households within the village are more likely to be engaged in agricultural production themselves and are a local source of technology information for parents.

While the total number of groups does not capture differences in group objectives, which could affect network density depending on the type of network, the results of regressions not reported here do not show a consistent impact of membership in a particular group on the size of a particular network.[15] In almost all cases, the coefficient of membership in a specific group is insignificant. We therefore conclude that different motivations drive participation in groups and in social networks, and that formal group membership neither substitutes for nor encourages the formation of trust-based networks. Because trust-based networks tend to be based on personal relationships (Fafchamps and Gubert, 2007), economic factors are not the most important determinants of such networks.

6. ECONOMIC RETURNS TO GROUPS AND NETWORKS IN THE PHILIPPINES

The regressions on group membership and on total network size suggest that negative shocks increase households' participation in groups and the size of one's network. In the present analysis, we do not provide definitive evidence that participation in groups and networks reduces the impact of shocks in the Philippines. Rather, we explore whether participation in groups yields economic returns in terms of increased per capita expenditures, the extent to which migrant networks form in response to shocks, and their possible impact on sending households.

[15] In most cases, the first-stage diagnostics suggest that the instrument set is weak. Alternatively, where the Cragg-Donald statistics are in an acceptable range, we reject the over identification test.

Table 8. Impact of group membership on per capita expenditures: Total number of groups[16]

	OLS		IV	
Variables	**Coeff**	**z**	**Coeff**	**z**
Total number of groups (endogenous)	0.127	**5.07**	0.163	**3.99**
Age of household head	0.015	**1.81**	0.015	**1.87**
Log household size in 1984	-0.237	-1.55	-0.240	**-1.68**
Dependency ratio in 1984	-0.143	**-2.71**	-0.149	**-2.81**
Household head has elementary schooling	0.176	**2.05**	0.170	**2.07**
Household head has secondary schooling or better	0.304	**3.12**	0.267	**2.50**
Asset quartiles in 1984, lowest excluded				
Lowest quartile	-0.412	**-3.19**	-0.380	**-3.15**
Second quartile	-0.350	**-3.54**	-0.328	**-3.36**
Third quartile	-0.142	-1.41	-0.121	**-1.28**
Area of titled land in 2003	0.039	**8.06**	0.039	**8.33**
Barangay average area of titled land, household excluded	0.030	**2.15**	0.034	**2.46**
Agricultural household in 2003	0.005	0.11	0.002	0.04
Household has nonagricultural business in 2003	0.080	1.00	0.070	0.87
Constant	5.605	**13.75**	5.560	**14.08**
Number of obs	304		304	
F(13, 29)	57.90		42.53	
Prob > F	0.00		0.00	
R-squared	0.44			
Test of exogeneity: H0: Regressor is exogenous				
Wu-Hausman F test (p-value)			0.94	0.33
Durbin-Wu-Hausman chi-square test			0.99	0.32
Instrumental variables diagnostics				
F-test on excluded instruments (F-test, p-value)			21.38	0.00
Anderson canon. corr. LR statistic (identification/IV relevance test) (Chi-2, p value)			85.008	0.00
Hansen J-statistic (overidentification test) (Chi-2, p-value)			8.162	0.32

To explore whether group membership generates economic returns, we estimate the impact of group membership—the total number of groups—on per

[16] Notes: Instrumental variables estimates with attrition weights; standard errors robust to clustering within barangay; t-statistics and z-values in bold are significant at 10% or better.

Excluded instruments: Whether household is a sugar producer, whether head was Catholic in 1984, barangay heterogeneity indices in 1984: origin, ethnicity, assets, and education, per capita expenditures on groups in 1984, barangay mean number of groups, household excluded.

capita expenditures using 2SLS to control for the potential endogeneity of group membership. As in the preceding section, we investigate whether the number of groups to which the household belongs has an impact on per capita expenditures.[17] We regress log per capita expenditures on human capital of the household head (age in 2003, whether the household head completed primary education, whether he completed secondary education), household demographics (log household size and dependency ratio in 1984), asset quartiles in 1984, the area of titled land in 2003, the *barangay* average of titled land in 2003 (excluding the household), and dummies for productive status.[18]

Both OLS and IV estimates are reported in Table 8, with exogeneity tests leading us to accept the null hypothesis that the total number of groups can be taken as exogenous in a regression on per capita expenditures. The total number of groups to which a household belongs has a positive and significant impact on log per capita expenditures, while the signs of the other coefficients are as expected. However, the total number of groups might mask the impact of individual groups. Since participation in economic oriented groups might have a higher impact on per capita expenditures, we also explore alternative specifications where group membership reflects group membership in production, credit, burial, religious, and civic groups, respectively. These results, which are not reported here, suggest that membership in burial, religious, and civic groups have a significant positive impact on per capita expenditures.

We are unable to investigate whether social networks also yield economic benefits because we lack credible instruments that affect social networks but do not directly affect per capita expenditures. Insights from the qualitative work conducted among respondent households that experienced covariate and idiosyncratic shocks, however, suggest that local networks only have a limited ability to help households cope with shocks. Several respondents mentioned that they feel embarrassed to ask for help from their friends and neighbors, who are also poor and also face similar problems—even in the case of a household-specific shock such as illness (prior to the introduction of government-provided health insurance). Local networks can offer limited support in the case of a covariate shock. When faced with negative shocks, households use a variety of coping mechanisms: working harder, relying on help from children who have left the home and who are now working, borrowing money from informal sources, and selling or mortgaging assets.

Studies of collective action typically focus on nonfamilial groups. However, both the anthropological (see the review by Arce, 2003) and the economic literature on the Philippines suggests that kinship affects participation in groups notably risk-sharing networks (Fafchamps and Lund, 2003; Fafchamps and Gubert, 2007). The findings from our analysis of trust-based networks also suggest that "migration

[17] Results using expenditures per adult equivalent yield similar results that are not reported here; we discuss per capita expenditures for comparability with other studies.

[18] The set of excluded instruments in the instrumental variables regressions are variables explaining various forms of group membership that do not directly affect per capita expenditure; the choice of these variables was motivated by the previous analysis of group membership. These excluded instruments are whether the household is a sugar producer, whether the head was Catholic in 1984, *barangay* heterogeneity indices in 1984, per capita expenditures on groups in 1984, and the *barangay* mean number of groups, excluding the household.

capital" and "local" social capital are substitutes. Given these findings, we examine the role of familial migrant networks in consumption smoothing. In our study sample, close to half—47 percent—of children 15 and older are migrants to rural, peri-urban, and urban areas in the Philippines as well as overseas. Similar to the national pattern, a higher proportion of migrants is female. Households with migrant children may invest less in local social capital because they can rely on transfers from their migrant children, particularly their daughters. We investigate this by examining the impact of migration and remittances, both endogenously determined, on various measures of well-being of parent households (this draws from Quisumbing and McNiven, 2007).

Table 9 presents estimates of the probability of having an adult migrant child (21 years and older), the number of migrants age 21 and above, the probability of receiving remittances from outside the *barangay*, and the amount received. Marginal effects are presented—that is, the change in the dependent variable resulting from a one unit change in the regressor. We find that both household and community characteristics play an important role in the migration decision. While the education of the household head has a weak negative impact on the number of adult migrants, higher educational attainment of the children themselves increases both the probability of migrating and the stock of migrants, with daughters' completed schooling having a larger impact than sons'. 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 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 high, there may be diminishing returns to additional migration.

Table 9. Determinants of the probability of having a migrant child, total number of migrants, the probability of receiving remittances and total remittances received[19]

	Parents who were reinterviewed in 2003							
	Probability of having a migrant child over 21		Number of migrant children over 21		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	**2.05**	0.190	1.57	-0.094	**-2.00**	-1.407	-0.77
Age squared	0.000	**-1.68**	-0.001	-0.79	0.001	**2.02**	0.011	0.69
Education of household head	-0.001	-0.19	-0.054	**-1.68**	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	**-1.66**
Cumulative shocks, 1984-2002	0.018	1.10	0.085	1.13	0.090	**3.44**	1.997	**1.74**
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	**2.45**	0.077	**3.06**	0.011	1.26	0.647	1.60
Mean education of daughters 21 and older	0.021	**4.65**	0.111	**5.39**	0.013	**1.80**	0.807	**2.45**
Duration of road connecting village to town	-0.004	**-2.08**	-0.013	**-1.87**	0.006	**2.36**	0.327	**2.87**
Duration village was electrified	0.009	**2.18**	0.046	**2.51**	-0.023	**-3.50**	-1.088	**-3.80**
Percentage of migrants from other households in village	-0.004	**-2.68**	-0.029	**-3.86**				
Percent deviation from trend GDP in 2002, male migrants					0.042	**2.13**	1.420	**1.88**
Percent deviation from trend GDP in 2002, female migrants					0.075	**4.04**	1.988	**2.91**

[19] Notes: z-values in bold are significant at 10% or better.
Probit z values computed using robust standard errors.

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)	**70.24**	155.81	53.24	55.69
Prob > chi2	0.00	**0.00**	**0.00**	**0.00**
Pseudo R2	0.31	0.13	0.17	0.01

While parental wealth affects neither the probability of receipts nor the amount received, remittances appear to perform a consumption-smoothing function. Cumulative shocks up to 2002 increase both the likelihood of receiving remittances and amounts received. 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. 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. These results support our earlier findings that parents invest less in local networks if they have more daughters living outside the village.

How do migration and remittances affect parent households? Table 10 presents the coefficient estimates on the number of migrants age 21 years and above, and remittances on various outcomes of the parental household. Both migration and remittances are treated as endogenous in the IV regressions.[20] Our estimates suggest that investment in migrant networks involves tradeoffs. The number of migrants has 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). Remittances, on the other hand, have significant positive impacts on housing and consumer durables, and the total value of nonland assets and total expenditure per adult equivalent. Similarly, expenditures on clothing and footwear, education, and alcohol and tobacco increase significantly with remittances. Clearly, financing educational expenditures of family members is an important use of remittances. These positive impacts on productive assets and schooling mirror the findings of Yang (2004), who 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.

[20] See Quisumbing and McNiven (2007) for more detail on the IV regressions.

Table 10. Impact of migration and remittances on asset holdings and consumption expenditures of parent households[21]

	Coefficient on number of migrants		Coefficient on remittances	
	IV		IV	
Outcome	**Coeff**	**z**	**Coeff**	**z**
Assets in 2003				
Farm and business equipment	-0.219	-0.01	2.158	1.43
Livestock	-0.865	-0.80	0.127	1.40
Housing and consumer durables	-46.555	**-2.01**	5.127	**2.14**
Total nonland assets	-184.311	**-1.67**	12.677	**1.81**
Value of land	-136.673	-1.52	5.266	1.17
Value of land and assets	-320.984	-1.62	17.943	1.59
Expenditures per adult equivalent in 2003				
Total expenditure	-136.786	**-2.74**	8.855	**1.97**
Food	-21.113	-1.53	1.136	1.27
Clothing and footwear	-5.366	**-1.97**	0.636	**3.06**
Health	-13.058	**-1.79**	0.625	1.44
Education	-13.636	-1.16	2.276	**2.60**
Family events	-23.821	**-2.10**	1.313	1.53
Alcohol and tobacco	-4.467	**-3.37**	0.255	**2.11**
Partial R-2 of excluded instruments	0.243		0.0647	
F-test of excluded instruments	20.31		2.200	
p-value	**0.00**		**0.05**	

[21] Notes: Instrumental variables regressions estimated with attrition weights; standard errors are robust to clustering within villages. 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 villages.

Cragg-Donald weak identification statistic	2.090
Anderson canonical correlation LR statistic	19.56
p-value	**0.01**
z-values and p-values in bold indicate significance at 10% or better	

8. CONCLUSIONS AND POLICY IMPLICATIONS

Using longitudinal data from Bukidnon, Philippines, followed up by focused qualitative work in the survey villages, we have attempted to understand the role of groups and networks in determining how the poor manage their exposure to risks and cope with shocks to their livelihoods. Aside from determining the impact of shocks on consumption, and how these may vary across different types of households, our analysis allows us to arrive at some conclusions regarding the role of asset endowments and heterogeneity in network formation and risk-smoothing, and the role of different types of enforcement mechanisms so that the network can achieve its risk-smoothing objectives.

Drought and the death of the household head or spouse have significant impacts on the well-being of Filipino households. While drought has a negative impact on all households, it has a significant negative impact on households with less land and assets. Death of a household head or spouse has a stronger negative impact on per capita consumption for households that have more land and assets—probably because these households are more heavily engaged in agriculture.

Accumulation of social capital comes easier to the wealthy. This finding is important to development agencies that deliver services through groups or that encourage the poor to invest in "social capital" because it is easier to acquire than physical assets: the poor are disadvantaged even in the acquisition of social capital. However, participation in less economically-oriented groups such as religious and civic groups, as well as insurance groups like burial groups, is less closely associated with initial wealth than participation in production and credit groups. Burial groups not only serve an important insurance function, but also seem to reach a wide spectrum of society.

Different aspects of heterogeneity matter in the formation and conduct of collective action institutions. Disparities in ethnicity, assets, and education at the village level are likely to discourage the formation of groups, although they do not affect the formation of trust-based networks. Thus, external heterogeneity is not necessarily "good" for social capital formation; this may partially explain the difficulty of some collective action efforts in the Philippines, which has a highly unequal income distribution. However, heterogeneity with respect to location may be important in insurance against covariate shocks.

Networks composed of spatially-diversified children perform an important insurance function against covariate shocks that may not be achievable by local networks. While spatially-diversified networks might offer more insurance against covariate shocks, problems of asymmetric information are greater. It is therefore no surprise that in the Philippines migrant networks are composed primarily of

family members (children) since norms are easier to enforce within the family. Children, especially daughters, are socialized to have *utang na loob*, a debt of gratitude in the form of reciprocity for favors granted (Lopez, 1991). As part of *utang na loob* children must obey and respect their parents and fulfill their obligations long after parents have reared them to maturity. Indeed, children are expected to be everlastingly grateful to their parents not only for raising them, but more fundamentally for giving them life itself (Racelis Hollnsteiner, 1973). Failure to live up to these obligations is severely sanctioned, even with threats of divine retribution.[22] Thus, children, even those who live far away, continue to contribute to their parents.

Because shocks can have adverse consequences in both the short and long term, understanding the appropriate role for public policy is important for sustainable poverty reduction. Policies to help poor households cope with shocks must take into account Filipino social and organizational culture since policies that are not mindful of the social context may backfire by eroding indigenous social support mechanisms. These results suggest a number of policy implications. First, development practitioners and policymakers need to be more realistic about the possibility of using collective action to deliver services directly to the poor or encouraging the asset-poor to accumulate social capital. Identifying those barriers that prevent the poor from participating in collective action is an important task for development practitioners. Poorer folk often express *hiya* (in Tagalog) or *kaulaw* (in Cebuano-Visayan, the language spoken by our respondents), literally translated as shame, but actually meaning the uncomfortable feeling that one is in a socially unacceptable position (Lynch, 1973) when approaching wealthier individuals for help in time of need. Fear of being unable to reciprocate may also prevent poorer households from approaching richer households for help since reciprocity is at the core of Filipino social transactions (Racelis Hollsteiner, 1973). Such feelings of discomfort may interfere with efforts to have a more heterogeneous mix of households in groups—and to achieve consumption-smoothing within formal groups. Such shame may be tempered if the richer individual is a relative, even a distant one. Thus, it is not uncommon for kinship networks to perform consumption-smoothing functions.

Second, because local networks and other forms of collective action have limited effectiveness when there are covariate shocks, this is the appropriate arena for public policy. Even if migrant remittances may respond to covariate shocks, substantial time lags may be involved, and not all households in a locality may have access to migrant remittances. Third, certain types of networks do provide insurance against some types of idiosyncratic shocks such as illness, and these tend to be the sort of shocks where, because of information asymmetries, public action may tend to be less effective. Consideration should be given to thinking of public action as taking on an enabling role; examples of this in the Philippines include facilitating interventions (such as improvements in information and communications technology, or reducing transactions costs in making remittances) that lower the

[22] Among various Bisayan-speaking groups, such as those in our study sites, failure to look after aging parents is sanctioned by *gaba*, or divine retribution. However, few persons attribute illness to *gaba*, or to *gaba* from that cause, which can be interpreted to mean that children actually live up to their obligations! (Lopez, 1991:8).

costs associated with developing and maintaining family networks. In the Philippines, for example, it is now possible to make bank payments and remittances by sending a text message using a cell phone. Finally, public policy needs to be aware of indigenous networks that already exist and ensure that government action does not displace already functioning local networks.

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