FCND DP No. 142

FCND DISCUSSION PAPER NO. 142

SOCIAL CAPITAL AND COPING WITH ECONOMIC SHOCKS: AN ANALYSIS OF STUNTING OF SOUTH AFRICAN CHILDREN

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December 2002

ABSTRACT

South African households live in an environment characterized by risks, and many face a significant probability of experiencing economic losses that threaten their daily subsistence. Using household panel data that include directly solicited information on economic shocks and employing household fixed-effects estimation, we explore how well households cope with shocks by examining the effects of shocks on child nutritional status. Unlike in the idealized village community, some households appear unable to insure against risk, particularly when others in their communities simultaneously suffer large losses. Households in communities with more social capital, however, seem better able to weather shocks.

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ACKNOWLEDGMENTS

The KwaZulu-Natal Income Dynamics Study (KIDS) analyzed in this paper is the result of a collaborative project of the International Food Policy Research Institute, the University of Natal–Durban, the University of Wisconsin–Madison, and the Southern Africa Labour and Development Research Unit at the University of Cape Town. This research is part of the Legacies of Inequality project supported by the John D. and Catherine T. MacArthur Foundation; financial support is also gratefully acknowledged from the U.S. Agency for International Development via a University Partnership Grant. This paper has benefited from the comments of Lawrence Haddad, Robert E. B. Lucas, Emmanuel Skoufias, and seminar participants at the University of Wisconsin–Madison and the Inter-American Development Bank. Robert White provided excellent research assistance.

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1. Introduction

Using South African household panel data that include directly solicited information on economic shocks, this paper explores three questions:

1. Which households are able to cope with economic shocks?
2. Is it more difficult for households to cope with covariant as opposed to idiosyncratic shocks?
3. Do households enjoy access to "social capital" that facilitates their capacity to cope with either type of shock?

To address these questions, we exploit research that shows that malnutrition occurring from the prenatal period to age 3 permanently affects the growth of young children. Economic losses that destabilize household consumption and result in malnutrition over the inter-survey period would therefore be captured by nutritional status measures taken in the second survey round. By examining height-for-age Z-scores of young children, then, we are looking for indirect evidence of failed consumption smoothing that was particularly costly in terms of child welfare.

There is increasing evidence that risk-averse households seek to smooth their consumption in the face of fluctuating incomes. Less certain, however, is their capacity to do so in the absence of the full and complete markets that would permit them to either purchase insurance in anticipation of shocks or borrow against future earnings to smooth consumption in the wake of realized economic losses. Of course, even in the absence of insurance markets and the presence of binding borrowing constraints, households may be

able to smooth consumption through a variety of nonmarket and self-insurance mechanisms. Townsend (1994), for example, demonstrates that local communities can and do mutually insure themselves against idiosyncratic income fluctuations. Deaton (1991) suggests that by following a simple precautionary savings strategy, individual households can self-insure against covariant shocks, or any other kind of economic loss, and achieve relatively smooth consumption.

While these arguments are compelling in their implication that the welfare losses associated with incomplete markets may be modest, they have been questioned on both empirical and theoretical grounds.[1] In weakly diversified, weather-dependent economies, covariant risk can be an important source of overall income instability (Carter 1997). Moreover, poor households are not always able to manage shocks autonomously through self-insurance (Jalan and Ravallion 1999). Therefore, the ability of households to use informal insurance mechanisms to manage both idiosyncratic and covariant shocks becomes critical.

The available evidence suggests that informal insurance functions most effectively for idiosyncratic shocks. A plausible explanation for this finding comprises two parts. The first is that the links necessary to assure informal insurers that their actions will be reciprocated in the future is tightly circumscribed geographically. In other language, the *social capital* needed to secure informal insurance is localized geographically, where social capital is broadly defined as networks, norms, and trust that

[1] Factors that limit household capacity to smooth consumption include state-dependent discounting, subsistence constraints, and competing uses of capital (Zimmerman and Carter 2002).

enhance the incentive compatibility of noncontractual or legally unenforceable exchange. The second is that households willing to informally insure one another share similar livelihoods and living standards. A covariant shock that strikes all households would leave all in similarly dire straits with little possibility for (intertemporal) arbitrage between households with low and high post-shock marginal utility of consumption. The presumption would appear to be that social capital is highly localized in socioeconomic terms and exists only between households that share similar socioeconomic identities.

While the notion that social capital is highly localized is appealing, the literature has identified a different form of social capital, known as *bridging social capital,* that cuts across geographic and socioeconomic distance (Narayan 1999). The existence of bridging social capital might enable informal insurance mechanisms to help households cope with covariant economic shocks.[2] Conversely, its absence would signal the problematic exposure of households to covariant shocks, especially those households that find self-insurance too costly to obtain. Exclusion from bridging social capital might be most severe in societies where class, social identity, and area of residence are all highly correlated. South Africa would appear to be a prime example of a society where bridging social capital is costly to construct, and therefore where covariant shocks are likely to weigh heavily on the coping capacity of poor households.

[2] Church groups that create linkages across space and economic class would be one example of bridging social capital that could help households smooth consumption in the wake of a community-wide shock.

2. Growth of Young Children as an Indicator of Coping Capacity

Much of the literature on the effect of shocks on the economic well-being of households focuses on consumption (Townsend 1995; Jacoby and Skoufias 1998) and, sometimes, income smoothing (Morduch 1995). Examining smoothing is particularly powerful when considering the effects of recent events using, for example, annual or even higher frequency data. For longer time periods, such as in the household panel data we analyze with two observations five years apart, a similar analysis would be much less informative because the effects of shocks might be dampened substantially. Of course, another equally important area to investigate related to current consumption smoothing is past consumption smoothing, i.e., the effects and persistence of shocks, even transitory ones, that have occurred in the more distant past.

Given time lags and the various mechanisms identified in the literature for smoothing, however, it is likely to be difficult to detect long-term effects of shocks on end-of-period consumption in the South African data we examine. Therefore, we take a different approach, investigating the effect of shocks on a long-term indicator of human capital, child height-for-age Z-scores standardized for age and gender, using the U.S. National Center for Health Statistics norms. This approach provides a conservative test of consumption smoothing, since households are likely to protect the nutritional status of their young children as a result of the potentially serious long-term consequences, including mortality, of not doing so. In some measure, it is also a more sharply focused test than one that examines overall consumption, since consumption comprises a mix of

many imperfectly measured components, all with attendant biases that may distort the test. Finally, since declines in nutritional status for young children today translate into lower levels of human capital, and thus economic development, in the future, it is also a test of the persistent effects resulting from failures of consumption-smoothing efforts.

The narrow focus of the test necessitates careful interpretation when we fail to reject the null hypothesis that the observed shocks had no effect on child nutritional status. Failure to reject should not be construed as evidence in *favor* of general consumption smoothing, but only of a capacity to smooth with respect to child nutritional status. In other words, the test will not detect breakdowns in consumption smoothing that did not affect the child.

Our approach is similar to that of Dercon and Krishnan (2000), who characterize the capacity of individuals in rural Ethiopian households to smooth consumption by examining how individual, household, and aggregate shocks impinge on adult nutritional status. They find that poorer households are unable to smooth consumption during the year, and members' nutritional status, as measured by body mass index, varies significantly. Because of the relationship between increased consumption and economic productivity, however, examining adults is probably more difficult than examining children.

To describe the test we implement, we first briefly explain the nutritional science underlying it. In large part because they are growing so fast, young children have high nutritional requirements. At the same time, they are also susceptible to infections, because their immature immune systems fail to protect them adequately. As a result,

malnutrition is most common and severe in utero and during the first few years of childhood (UNICEF 1998). One aspect of early malnutrition is increased mortality (Pelletier et al. 1995). Another is that growth failure occurs primarily in utero and in the first three years of life and causes short stature of adults (Martorell et al. 1995). Research in economics identifies the significant role of childhood nutrition in other outcomes as well, including educational achievement and cognitive abilities (Alderman et al. 2001a, Glewwe and King 2001).

Those early years, then, represent a particularly vulnerable period for children, after which it is more difficult to alter a child's growth trajectory. Our estimation strategy will exploit these underlying biological relationships and focus on the effects of economic shocks on children during that vulnerable period. We match retrospective information on household losses and gains during the previous five years to the period of vulnerability for each child under 5 in 1998. The most vulnerable periods are shown in Figure 1. A child who is 1 year old in 1998 is vulnerable during that year and also for a large portion of 1997, the period corresponding to her prenatal development (shaded a lighter gray). Similarly, a child who is 2 years old in 1998 is vulnerable in 1997–1998 and part of 1996.

Based on the scheme presented in Figure 1, for each child we characterize the environment of positive and negative events during a child's susceptible period as follows. First we calculate the real value of all negative and positive shocks separately for each household for each year between the survey rounds (this is described in detail in the *Retrospective Measurement* discussion in Section 3). A child aged 1 in 1998, then, was

vulnerable in 1997 and 1998, so we associate the average annual loss (gain) of the child's household for 1997 and 1998 with that child. Her older sibling aged 5 in 1998, although living in the same household, was most vulnerable in an earlier period, from 1993 to 1996. These differential exposure periods by siblings within the same households enable us to control for all time-invariant household-level factors in the estimation.

Figure 1—Age-vulnerable periods for children from conception to age three

	Age of child in 1998				
Event year	**1**	**2**	**3**	**4**	**5**
1998					
1997					
1996					
1995					
1994					
1993					

3. Characterizing the Stochastic Environment Faced by Households in KwaZulu-Natal

The KwaZulu-Natal Income Dynamics Study

In order to explore the capacity of households to cope with economic shocks, we use a panel survey of South African households. The first round of the survey was undertaken in the last half of 1993 (PSLSD 1994) at the national level. South Africa has experienced dramatic political, social, and economic change since the democratic national elections in 1994. With the aim of addressing policy research questions concerning how these changes were affecting South Africans, African and Indian

households in KwaZulu-Natal Province were resurveyed in March–June 1998 for the KwaZulu-Natal Income Dynamics Study (KIDS) (May et al. 2000).

Formed by combining the former Zulu homeland and Natal Province, KwaZulu-Natal is now South Africa's largest province, containing one-fifth of the country's population of approximately 41 million. Though not South Africa's poorest province, about two-fifths of its residents live in poverty (Carter and May 2001). It is also ethnically diverse: 82 percent of the population are African (and nearly all of these Zulu), 10 percent Indian, 7 percent white, and 1 percent coloured. During the mid-1980s and again in the early 1990s, there was substantial political unrest and violence in KwaZulu-Natal, which makes the province an especially interesting place to study the relationship between economic shocks and social capital.

In 1993, the KwaZulu-Natal sample was representative at the provincial level and contained 1,354 African and Indian households. Of the target sample, 1,132 households (84 percent) were successfully reinterviewed in 1998, success being defined as having reinterviewed at least one adult member from the 1993 household (Maluccio 2001). This rate of attrition is on par with or below those of similar studies in developing countries.

To ensure comparability, the 1998 household questionnaire largely followed the 1993 version, an integrated household survey similar in design to a World Bank Living Standards Measurement Survey that included, among other things, measures of demographic structure, household income and expenditures, and anthropometric measures for children age 6 and under. In addition, a number of new modules were

introduced, the most important of which for this paper is the section on surprise economic events or shocks experienced by the households.

Retrospective Measurement of "Random" Losses and Gains

In the so-called shocks module, households were asked to report whether any of a set of events identified through pretesting had occurred "by surprise" during the five-year reference period. Negative economic events included things affecting individuals within or connected to the household (e.g., death, serious injury, illness, loss of a job), declines in resource flows to the household (e.g., cutoff or decline in private remittances or government grants), and property losses suffered by the household (e.g., theft, crop failure, loss of livestock, business failure).

A key innovation in the module developed for the KIDS was that it goes beyond a mere accounting of the number and type of events that occurred; rather, it attempts to assign a value to the economic loss they caused. For each event that occurred, the household provides the following information: (1) the year it occurred; (2) how long it lasted in months; (3) the monthly decline in household income; (4) the total once-off expenditures; and (5) the value of items lost.

Another innovation of the shocks module was a section designed to avoid the asymmetry of considering only negative events by asking about positive ones. Potential positive events included the obvious counterparts to some of the negative events described above (e.g., new job, new or increased remittances or government grants) as

well as others, such as retirement payouts from firms, inheritances, large gifts, and scholarships.

Table 1 provides the frequency distribution of the various events reported for the 1,132 households. The top panel shows that the most common reported event is death, followed by serious illness or injury, the loss of a job, and theft, fire, or the destruction of property. On average, households reported slightly more than one negative event each. The bottom panel shows that far fewer positive events were reported over the period, about one-third of an event, on average, per household. Over half of the positive events are a new job; it turns out that about one-quarter of those who report losing a job subsequently report getting a new one. While 70 percent of the households report at least one negative event and 30 percent report at least one positive event, fully 25 percent do

Table 1—Economic events in the KwaZulu-Natal Income Dynamics Study (KIDS) 1993–1998

Events	Frequency	Percent
Negative		
Death of household member or family member	431	32.2
Serious illness or injury	241	18.0
Loss of job	228	17.0
Theft, fire, or destruction of property	180	13.4
Death or disease of livestock	97	7.2
Major crop failure	62	4.6
Other	101	7.6
Total negative events	1,340	100.0
Positive		
New job	210	53.2
Increased grant or pension	60	15.2
Firm payment	38	9.6
Increased remittances	35	8.9
Inheritance	18	4.6
Other	34	8.5
Total positive events	395	100.0

not report an event of either type over the five years. Those households reporting both negative and positive events may be living in riskier circumstances than those that report neither.

An examination of the distribution of events by race indicates only a few differences between Africans and Indians. Indian households, which are almost exclusively located in urban areas, rarely suffer agricultural-related negative events. Indians are also very unlikely to report increased remittances or government grants, though they are somewhat more likely to report payouts from firms, reflecting their closer integration with the formal economy.

To construct measures for the value of gains and losses utilized in this paper, we start by aggregating the flow of reported losses and, separately, gains due to different events in each year for each household. We do not combine gains and losses, allowing us to explore whether positive and negative flows have symmetric effects. In a hypothetical example of a serious illness by a household member reported in 1994 that lasted 24 months and had an associated one-time expenditure of 1,000 rand (R) and monthly income loss of R100, we would calculate the household level loss as follows: we first assume that the event occurred in the middle of the year and assign the one-time expenditure of R1,000 and six months of the monthly income loss to 1994 ($6 \times$ R100 + R1,000 = R1,600), 12 months of the monthly income loss to 1995 (R1,200), and the final six months of income loss to 1996 (R600).

As a second hypothetical example, consider the death of a household member. In this instance, the reported once-off losses are the out-of-pocket expenses for the funeral and related services. If the deceased had an income, this would not be captured directly, as the calculated loss likely represents a lower bound estimate. It should be apparent from these two simple examples that valuing the economic events and apportioning their costs and benefits are inexact exercises subject to measurement errors. This is a theme we return to in the empirical analysis.

Another measurement concern is possible retrospective reporting bias. For example, if households were more likely to report recent or more severe events, this could bias inferences made using the reported data. When long-term recall is required, accuracy is increased if the information is related to some salient event or period in the respondent's life. In South Africa, it is certain that one of the most important events in recent history was the 1994 national democratic election that brought the African National Congress and President Nelson Mandela to power. Since the 1993 survey was undertaken about six months prior to these elections, interviewers were trained in 1998 to introduce retrospective questions relating to 1993 with the phrase "in the year before the first democratic national elections." Thus, a priori, the retrospective data are likely to be accurate.

Examining the annual reporting patterns, there does appear to be a tendency for higher frequency reports in later years. While this is possible in an increasingly uncertain environment where, for example, unemployment was increasing, there is also the possibility that it represents a bias toward reporting easier-to-remember, i.e., more recent,

events. At the same time, and consistent with complete reporting, there are fewer events reported in the 1993 and 1998 periods, which each covered less than a full year. In addition, evidence from an independently collected cluster or community (hereafter community) survey corroborates the observed annual reporting pattern. Nevertheless, given the higher number of reported events in 1996–1997, some of the analyses that follow will focus on the more recent events in order to sidestep recall problems.

After calculating loss and gain measures for each household in each year from 1993 to 1998, we next explore how to measure what was happening to neighboring households in the community. First, for each household we calculate the average losses and gains for neighboring households in the community, excluding the household itself. We call these neighbors' average losses and gains. Second, to the extent possible, analogs to the household-level questions on positive and negative events were asked in 67 community-level surveys, which were completed by interviewing key informants in the community. Some of the possible events included weather or crop-related problems, changes in community services or major employers, and changes in community leadership. For each event indicated, in addition to the timing and duration, the proportion of the community affected and the severity of the effects were reported. Thus, while it is not possible to estimate the value of the losses or gains associated with these events, one can go beyond a mere accounting of the events.

The independently collected community information can serve both as a check on the household information and as a measure of aggregate shocks at the community level to use as an alternative to the average neighbors' shocks. These data are particularly

useful since in four of the communities, there were fewer than 10 households interviewed in 1998, so the information from other households is less likely to be representative of the geographic community. It is also useful because the community-level information will in part reflect a different set of shocks. We utilize both the household- and community-level information on events in the empirical analysis.

The Magnitude and Stochastic Structure of Economic Vulnerability

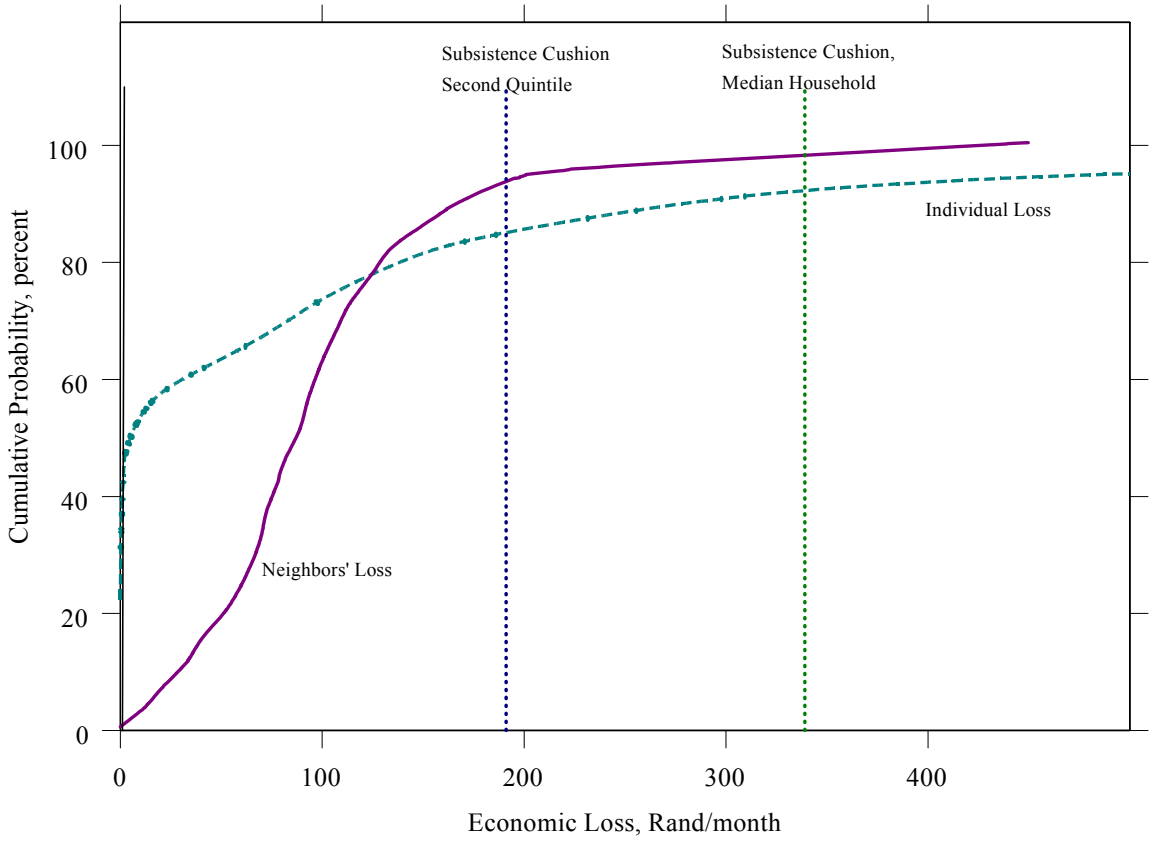
While there is a tendency to describe economic shocks as either idiosyncratic or covariant, the line between these two archetypal shocks quickly becomes blurred in real-world economies. Using the measures of own and neighbors' shocks, we can begin to explore both the magnitude of risk confronting households in KwaZulu-Natal as well as the covariance between their shocks and those of their neighbors who potentially stand ready to help them in times of need. The analysis in this section will focus on the degree and stochastic structure of vulnerability created by the risk of economic loss.[3] This vulnerability is likely to be especially important to the 40 percent of the KIDS households below the poverty line (Carter and May 2001).

Figure 2 presents the empirical cumulative distributions for economic losses experienced by individual households in the KIDS sample as well as the average loss experienced by their neighbors. To create these distributions, total economic losses for each household (and its neighbors) were calculated for the final 39 months covered by the

[3] We will refer only briefly to a parallel analysis of the distribution of positive shocks. Complete details of the analysis of positive shocks are available from the authors.

retrospective shock module of the KIDS survey and converted into a monthly equivalent. This 39-month span approximates the period of prenatal and early growth nutritional vulnerability that will be used to structure the analysis in the subsequent section. In addition, it includes only the more recent, and possibly more reliably reported, events. To characterize the magnitude and meaning of vulnerability in the sample, we first examine the marginal or unconditional distribution of economic losses on the presumption that

Figure 2—Marginal distributions of economic losses



exposure to loss is independent of other household characteristics. Later in this section we present the conditional distribution of vulnerability.

As can be seen from the dashed curve in Figure 2, some 44 percent of households reported no economic losses over this period. The overall mean loss in the sample (including households without a loss) is equivalent to a monthly income reduction of R95 in 1998. The overall mean loss figure represents, on average, 5 percent of 1993 real average monthly expenditures; for only those households that experienced a loss, the average impact is nearly 10 percent. The distribution of economic losses is skewed, with an approximately 20 percent probability of a loss that is at least twice the average loss of R95 per month.[4]

In the wake of an economic loss in which households were unable to fully smooth consumption, we would expect relatively well-off households to cut discretionary spending rather than cut the care of children. In order to get a sense of the likelihood of losses that might push households into a range where child nutrition must be sacrificed, we calculated a subsistence cushion for each household. This cushion is defined as the difference between the household's total expenditures in 1993, our proxy for permanent income, and the household's subsistence needs.[5] The two vertical dotted lines in Figure 2 show the subsistence cushion for the household at the second quintile and the median

[4] The empirical cumulative distribution function for economic gains shows a 60 percent probability of no gain and a 17 percent chance of a gain in excess of R190 per month.

[5] Subsistence needs are calculated based on household demographics and the subsistence market basket of goods calculated by the Institute for Planning Research at the University of Port Elizabeth (Potgieter 1993a, 1993b).

household, respectively.[6] The cushion for the household at the first quintile is negative (-R89 per month), indicating its expenditures are already below subsistence needs.

For the median household, there is a 7 percent probability of an economic loss that would reduce current consumption below subsistence needs. For a household at the second quintile, that probability increases to about 15 percent, while households in the lower 30 percent of the distribution have a greater than 50 percent chance that an economic loss will cut further into their ability to meet subsistence needs. While it is hard to know at what level a household with consumption-smoothing difficulties may be forced to cut into child nutrition, these figures suggest that the households in the KIDS sample face a significant risk of such an event.

The analysis to this point has failed to address the degree to which a household's own losses and those of its neighbors vary together. The presence of covariant risk might signal potential difficulties the household would face in relying on mutual aid or informal insurance to cope with economic losses. The solid curve in Figure 2 displays the empirical cumulative distribution of average losses experienced by neighbors. This distribution rises steeply and is much more compressed than the distribution for losses experienced by individual households. On its own, this suggests that the degree of covariance in losses is rather modest.

The analysis has also naively assumed that risk of economic loss is similar for households irrespective of their level of well-being or the size of their subsistence

[6] Median and quintiles are defined with respect to the distribution of cushion size.

cushion. To sharpen our understanding of loss exposure across different types of households and the impact of covariant risk, we estimate the conditional probability distribution of economic loss, $f(\ell_i \mid x_i, \ell_i^n)$, where ℓ_i are the losses experienced by household, *i*, x_i are conditioning characteristics of the household, and ℓ_i^n are the losses experienced by the neighbors of household *i*. Exploration of this conditional distribution, as opposed to the marginal distribution discussed above, will permit us to better characterize the distribution of vulnerability in the sample. To estimate the parameters of this distribution, we employ the following heteroscedastic Tobit specification for economic loss by household *i*:

$$\ell_i = \begin{cases} x_i\beta + \varepsilon_i \;\; if \;\; x_i\beta + \varepsilon_i > 0 \\ 0, \; otherwise \end{cases}, \tag{1}$$

where we assume that $\varepsilon_i \mid x_i \sim N(0, \sigma_i^2)$ and that σ_i is a linear function of a subset of x_i. We denote the heteroscedastic normal probability distribution function as $\phi(\varepsilon \mid x_i)$.

Table 2 presents maximum likelihood estimates of the parameters of equation (1).[7] As conditioning variables x_i, we employ measures of

- *conventional 1993 economic assets* of educated labor, uneducated labor, and productive capital defined as the value of tools and equipment, land, and livestock;
- *location*, measured by a rural-urban dummy variable;

[7] The estimates are based on 1,169 household-level observations reflecting the fact that some of the original 1993 households that were reinterviewed had split, and interviews were carried out in each of the newly formed households (see May et al. 2000 for details).

- *dependence on remittances and social transfers*, measured as total remittance and transfer income in 1993;
- *well-being*, measured as 1993 expenditures normalized by 1993 subsistence needs;
- *neighbors' contemporaneous losses*, measured by the average losses experienced by the household's neighbors.

The variance is specified as a function of the well-being and location variables.

Table 2—Economic loss: Maximum likelihood estimates of heteroscedastic Tobit model

Dependent variable: Economic loss (rand per month)	
Expected loss	
Educated labor (persons)	11.9655**
	(2.4)
Uneducated labor (persons)	20.8793
	(1.3)
Productive capital (R)	-0.0003
	(0.4)
Location (rural = 1)	-0.0748
	(0.0)
Transfer income (R per month)	0.1083***
	(3.4)
Well-being (1993 expenditures normalized by subsistence needs)	-33.418***
	(2.6)
Neighbors' loss (R per month)	0.3313**
	(2.3)
Constant	-42.9128*
	(1.8)
Variance of loss	
Location (rural = 1)	10.7644***
	(0.6)
Well-being (1993 expenditures normalized by subsistence needs)	98.6578***
	(8.2)
Constant	129.281***
	(5.6)
N	1,169

Notes: The ratio of the parameter to the standard error is given in parentheses. * indicates significance at 10 percent, ** at 5 percent, and *** at 1 percent.

Expected economic loss increases with the 1993 stock of educated labor. Though insignificant at the usual levels, the point estimate on uneducated labor is nearly twice that of educated labor, suggesting that income from uneducated labor is more prone to loss than is income from educated labor. Initial productive capital has no significant effect on expected losses. High levels of remittances and transfer income increase expected losses, demonstrating significant variability in these income components. The results also show the importance of covariant risk: expected losses increase by R0.33 for every R1.00 increase in the average loss experienced by one's neighbors. Finally, expected loss decreases with well-being, an indication that poorer households appear to be more vulnerable. At the same time, however, the variance of losses increases with well-being, as well as in rural areas.[8]

Figure 3 displays the implications of these estimates for the pattern of vulnerability and covariant risk. Whereas Figure 2 presented the marginal or unconditional cumulative density for economic loss, Figure 3 displays conditional densities for different household profiles. Letting x_j denote the values of the conditioning variables for household profile j, Figure 3 is constructed by using the maximum likelihood estimates to calculate

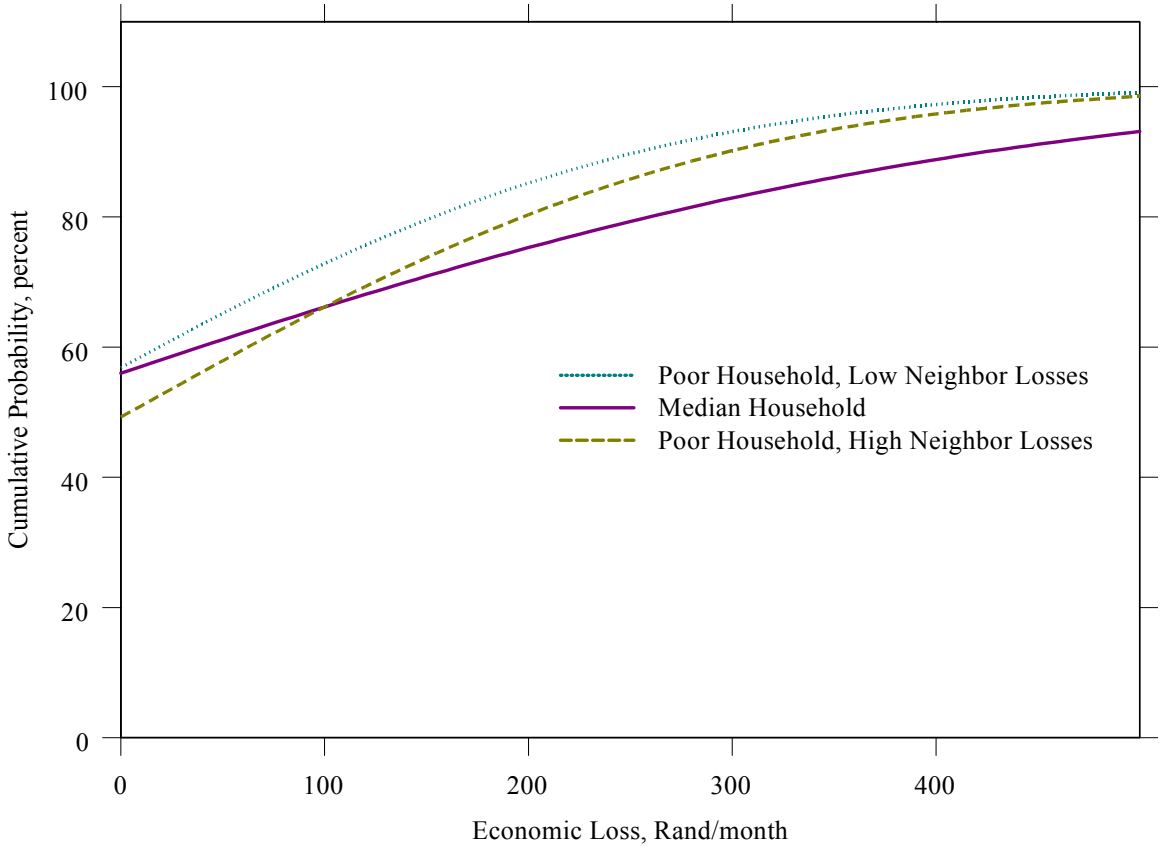
[8] Econometric analysis of the distribution of economic gains yields broadly similar results. Expected gains decrease with permanent income, while the variance of gains increases with permanent income. Gains appear more highly correlated across households than losses, and, in general, the conditional variance in gains is much higher than for losses. In rural areas, where the variance in losses was relatively high, the conditional variance in positive gains is, in fact, lower than in urban areas.

$$\Pr(\ell_j < \ell) = \Pr(x_j\beta + \varepsilon_i < \ell) = \int_{-\infty}^{\ell - x_j\beta} \phi(\varepsilon \mid x_j) d\varepsilon \qquad (2)$$

for each possible loss level ℓ, shown on the horizontal axis.

Ex ante, if we believe that the absolute risk faced by better-off households exceeds that faced by poorer households because the former have more to lose, we would expect the cumulative distribution for better-off households to stochastically dominate the distribution for poorer households (lying everywhere to the southeast of the distribution for poorer households). On the other hand, if we believe that poorer households occupy

Figure 3—Conditional distributions of economic losses



less stable and more vulnerable economic niches, we would expect the opposite relationship.

Figure 3 shows the conditional cumulative distributions for three different household profiles. The solid curve shows the cumulative distribution for a household that has the median value of all the conditioning variables. Probabilities are also shown for a poorer household located at the first quintile of the well-being distribution, with permanent income that is 89 percent of its subsistence needs. The dotted line shows the cumulative probabilities for this poor household when its neighbors experienced only mild losses (R30 per month, on average), while the dashed line shows probabilities for this same household when its neighbors suffered larger losses (R160).[9]

The first thing to note is that the mean and the variance effects of poverty on vulnerability are nearly offsetting. With low neighbor losses, the poor household has a 55 percent probability of no economic loss, almost identical to that of the median household. The cumulative distribution for the median household stochastically dominates that for the poorer household in this circumstance, indicating lower absolute risk for the poorer household whose neighbors are doing well.

When its neighbors, on average, have had hard times, however, that same poor household has only a 49 percent probability of no economic loss, five percentage points

[9] These two loss figures respectively represent the values at the first and ninth deciles of the neighbors' average loss distribution.

below the median household.[10] Indeed in this circumstance, stochastic dominance breaks down and the poor household has higher probabilities of losses up to about R100 per month than does the median household. Reflecting the importance of covariant risk, the fact that its neighbors have also suffered larger losses increases the probability of a loss of R100 by seven percentage points. Given that the poor household already lacks permanent income to cover its basic needs, even a loss this small might be sufficient to threaten child nutrition.

4. Social Capital and the Capacity to Cope With Idiosyncratic and Covariant Economic Shocks in KwaZulu-Natal

The previous section suggests that a substantial proportion of KwaZulu-Natal households are indeed vulnerable to economic losses that represent a large portion of their permanent income and that could challenge their subsistence-level well-being. Therefore, even when protecting child nutritional status is of the highest priority, unforeseen losses may overwhelm a household's capacity to avoid detrimental effects on child nutritional status. At the same time, many other households face only a minimal probability of such so-called subsistence shocks. Their prevalence suggests it may be important to consider how the effects of losses and gains are conditioned by wealth;

[10] While the shift in conditional probabilities is modest, the lack of strong positive covariance in the joint distribution of own and neighbors' losses does not mean that households and their neighbors never simultaneously suffer higher-than-average shocks. Even if the shocks were jointly normally distributed with zero covariance, we would expect 25 percent to suffer above-average shocks at the same time that their neighbors had above-mean shocks.

better-off households, for example, may be better able to self-insure, dampening any effects.

The empirical strategy, set out in Section 2, involves contrasting outcomes for children under age 5 living in the same household, who were exposed to different economic losses and gains during their respective vulnerable periods, i.e., a household fixed-effects model. Thus the influences of all fixed factors in the household, such as permanent income and characteristics of the parents, as well as any unobservable fixed factors, are swept out of the regression.

The key identification assumption is that there are no time- or child-varying unobservable factors that directly influence, or are correlated with, both child nutritional status and the economic events. To be sure, much changed in South Africa during the 1990s, and many of those changes are not observed in the data, nor will they be included directly in the regressions considered here. For example, the dismantling of apartheid was accompanied by massive investments in public health and education infrastructure in an effort to make those services available to the majority of the population. National or provincial time-varying factors that directly affect child outcomes will, in general, influence outcomes of all children of similar ages and thus be largely captured by controls for age. When changes are specific to certain communities, e.g., the opening of a new health clinic, its effects would be correctly attributed to community-level shock measures.

The more pernicious form of time-varying unobservables for this analysis is at the child or household level, possibly due to endogeneity of the reported shock information.

To this point, we have not addressed whether, and to what extent, the information gathered in the event modules should be treated as random shocks that are exogenous to the households (and communities). Our view is that this would be a strong assumption for some of the events reported on here. For example, it is probable that many of the events considered in the analysis did not come as a complete surprise to the household and some households may have prepared. Furthermore, even for those events that did come as a surprise, the reported measures of loss and gain may reflect the behavioral responses of the household. For example, while the total expenses for a funeral may have some largely fixed components, they may also reflect choices made by households based on their circumstances. Finally, some of the events reported may be correlated with other unobservable characteristics of the households or individuals within them.

One example that helps us think about how to assess whether these concerns are biasing our analyses is that of an illness striking the household and leading to a death or loss due to illness of an adult and *simultaneously* the illness of the child, whose nutritional status would thereby be compromised. In this instance, it is possible to find a correlation between the reported economic loss and nutritional status of the child that is spurious or overstated compared to the true effect of only the economic loss. It is more difficult to imagine this sort of confounding factor for the other types of economic events reported, however, so to probe its importance we will explore what happens when we limit the estimation to events unrelated to death or illness.

Coping With Economic Losses

In column 1 of Table 3, we present a base regression specification that includes only child-specific information. While very little of the overall variation is explained by these factors, they do explain approximately 5 percent of the within-household variation in height-for-age Z-scores and indicate that Z-scores deteriorate with age in the sample. Not only is this a common finding in the nutrition literature, it is also consistent with the

Table 3—The role of household and community losses and gains on stunting

Dependent variable: 1998 height-for-age Z-score of child				
Child characteristics				
(1) Male	-0.0640	-0.0883	-0.1126	-0.0983
	(0.4)	(0.6)	(0.7)	(0.6)
Age in 1998	-0.2414	-0.2283	-0.1844	-0.0794
	(1.0)	(0.9)	(0.8)	(0.3)
Age in 1998 squared	0.0096	0.0180	0.0086	-0.0076
	(0.2)	(0.4)	(0.2)	(0.2)
Household characteristics				
Ln (Loss)	-	-0.0658*	-0.0369	-0.0614*
		(1.8)	(0.1)	(1.7)
Ln (Gain)	-	0.1251**	0.8833***	0.8953***
		(2.0)	(2.6)	(2.6)
Ln (Loss) × Ln 1993 PCE	-	-	-0.0043	-
			(0.1)	
Ln (Gain) × Ln 1993 PCE	-	-	-0.1656**	-0.1674**
			(2.2)	(2.3)
Community characteristics				
Neighbors' average loss × 1000	-	-	-	0.0899
				(0.3)
Neighbors' average gain × 1000	-	-	-	-0.1477
				(1.0)
Constant	-0.1656	-0.4500	-0.2067	-0.1733
	(0.5)	(1.1)	(0.5)	(0.4)
F-test (age variables)	6.6***	2.6*	3.0**	2.4*
[p-value]	[0.01]	[0.08]	[0.05]	[0.09]
F-test all covariates	4.4***	4.2***	3.8***	3.5***
[p-value F]	[0.01]	[0.01]	[0.01]	[0.01]
N	716	716	716	716

Notes: Household fixed-effects estimates. Absolute value of t-statistics in parentheses. * indicates significance at 10 percent, ** at 5 percent, and *** at 1 percent.

general improvements in nutritional status over the period. Comparing children under 3 in both 1993 and 1998 from the KIDS sample, we find that there has been an increase in mean height-for-age Z-scores of nearly one-half of a standard deviation (from –1.2 to –0.8), a large change indicating that younger children are faring better, possibly as a result of public investments in health infrastructure. Finally, there is little difference in the sample between boys and girls' nutritional outcomes; this is not surprising since gender discrimination is generally thought to be less pervasive in South Africa than in other parts of the world.

In column 2, we introduce household-level losses and gains, measured in logarithms. Children who were in their vulnerable years during periods of losses in the household (holding gains constant) are nutritionally worse-off than those who were not. At the sample mean, a 1 percent increase in the loss leads to an approximately 10 percent decline in nutritional status as measured by height-for-age Z-scores. Conversely, children who were living in households that saw significant gains during their vulnerable years benefited from those gains.

Because of the greater possibility of self-insurance for wealthier individuals, we expect that the roles of both losses and gains might be weakened somewhat for better-off households. The next regression (column 3) explores this possibility by interacting the logarithm of per capita expenditures in 1993, our proxy measure of permanent income, by the household loss and gain measures. While there is no evidence of a differential effect of losses by initial logarithmic per capita expenditures (and this finding is robust to various characterizations of the relationship), there is a strong interaction effect between

initial logarithmic per capita expenditures and the size of the gain. (Note that initial logarithmic per capita expenditure does not enter the regression on its own since it is unchanging across siblings in the household.) The evidence from the second column that gains have a positive effect on child nutritional status is weakened for those with higher initial per capita expenditures, consistent with the likelihood that their children are already nutritionally secure. At the sample mean, however, the effect remains positive. In the regressions that follow, we include only the (significant) positive interaction.

Coping with Covariant Shocks

Next we address the role of community-level or covariant shocks. As described earlier, there are two formulations we can consider in the empirical work: (1) calculations of neighbors' losses and gains and (2) nonmonetary measures of aggregate shocks from the community-level survey. While there is overlap between the two measures, it is important to note that they are also likely to pick up different components of the risk structure in communities. For example, changes in infrastructure would be included in the second measure but not the first. We present results using the former measure (described in the previous section) and briefly discuss whether there are differences when we use the latter measure, as well as what happens when we include both.

Column 4 in Table 3 shows that neighbor measures have little effect on the household-level outcomes after controlling for the household-level losses and gains. In addition, when only neighbors' losses and gains are included and not the household-level ones, the former remain insignificant (results not shown). A variety of specifications have

been considered, including logarithmic transformations of these measures as well as the community-survey-based measures including severity of the shocks; all leave the basic results unchanged. Without considering other conditioning factors, such as social capital, it would appear that household-level shocks dominate. In the context of the literature on informal insurance, this suggests that households are unable to protect fully against idiosyncratic shocks, but at the same time they are relatively unaffected by the aggregate shocks in their communities, as we have measured them. Of course, it may also be possible that communities in South Africa are not as well delineated geographically as in other places where clear village boundaries prevail—implying that the shocks are measured with error.

Social Capital and Coping with Shocks

The existence of informal insurance mechanisms in certain areas is related to how closely linked people are in those places. Indeed, much of the literature on consumption smoothing focuses on rural communities, which are often more closely integrated than urban ones. When the above estimations are limited to the roughly 80 percent of rural respondents in the child sample, however, the results are unchanged. An alternative approach to exploring this hypothesis is to consider proxy measures of how well integrated various communities are, in order to explore whether the effects of shocks differ in areas that appear to be more or less integrated. In related research using these data, it has been shown that an important determinant of household welfare, as measured by per capita expenditures, is household membership in groups, a proxy for social capital

(Maluccio, Haddad, and May 2000). Here we take a similar approach and explore whether the initial number of groups and informal associations in communities in 1993 (a proxy measure for the social capital in the community and also across communities since the groups are not exclusively local) conditions the effect of losses at the household level. The results are presented in Table 4.

Table 4—The role of community groups on stunting

Dependent variable: 1998 height-for-age Z-score of child				
Child characteristics				
(1) Male	-0.0982	-0.0780	-0.0750	-0.0303
	(0.6)	(0.5)	(0.5)	(0.2)
Age in 1998	-0.0916	-0.1304	-0.1546	-0.1993
	(0.4)	(0.5)	(0.6)	(0.8)
Age in 1998 squared	-0.0059	0.0015	0.0050	0.0144
	(0.1)	(0.0)	(0.1)	(0.3)
Household characteristics				
Ln (Loss)	-0.0623*	-0.0639*	-0.0572	-0.0585
	(1.7)	(1.7)	(1.5)	(1.6)
Ln (Gain)	-0.9004***	0.8920***	1.0212***	1.0489***
	(2.6)	(2.6)	(2.9)	(3.0)
Ln (Gain) × Ln 1993 PCE	-0.1686**	-0.1655**	-0.2023***	-0.2099***
	(2.3)	(2.6)	(2.6)	(2.7)
Community characteristics				
Neighbors' net gain × 1,000	-0.1357	-0.1760	-0.2110	-0.2289
	(1.1)	(1.4)	(1.6)	(1.6)
Interactions				
Ln (Loss) × (1) if large neighbor loss*	-	-0.8959*	-1.0197*	-0.2919
		(1.7)	(1.9)	(0.5)
Ln (Loss) × # 1993 groups	-	-	0.8013	1.0153*
			(1.5)	(1.8)
Ln (Loss) × (1) if neighbor loss × # 1993 group	-	-	-	-2.3459**
				(2.1)
Constant	-0.2134	-0.1474	-0.0124	0.0209
	(0.5)	(0.4)	(0.0)	(0.1)
F-test (age variables)	2.6*	2.4*	2.6*	2.2
[p-value]	[0.08]	[0.09]	[0.08]	[0.11]
F-test all covariates	4.0***	3.8***	3.7***	3.7***
[p-value F]	[0.01]	[0.01]	[0.01]	[0.01]
N	716	716	716	716

Notes: Household fixed-effects estimates. Absolute value of t-statistics in parentheses. * indicates significance at 10 percent, ** at 5 percent, and *** at 1 percent.

In column 2 of Table 4, we consider the relationship between losses at the household and community levels. Our hypothesis is that households suffering a loss, the effect of that loss would be greater when they live in communities where their neighbors were suffering large losses at the same time, since local networks of support would be strained. After conditioning on the net community gain (derived by combining the neighbors' gains and losses for which there was little difference in Table 3), an interaction term between the household loss and a dummy variable representing those communities that had a large average neighbor loss shows that the damage to child nutritional status from household-level losses is exacerbated in communities that experienced large losses, consistent with the existence of informal sharing mechanisms.[11]

Next, we examine whether the relationship between household and community losses depends on the depth of existing linkages in the community. To explore this, we consider various interactions between own loss, neighbors' loss, and initial number of groups in 1993. The final specification in Table 4 shows the main findings. First, as with the other specifications in the table, at the household level the role of positive events appears to be robustly significant, though its effect is mitigated for wealthier households. Second, households that suffered a loss were better able to absorb it if they were in communities with a larger number of groups in 1993, consistent with the view that the latter is a proxy measure for social capital. Finally, this capacity is weakened in those

[11] Large losses here are defined as greater than R450 per capita. When smaller losses were used, the effects are weakened substantially, suggesting that it takes relatively large losses for informal sharing to break down.

communities where the neighbor losses were very large; there is little evidence, then, of the bridging sort of social capital that would allow shocks to be absorbed across communities. All of these results hold when, in addition, we include an interaction with household loss and 1993 community average per capita expenditures, in order to ensure that we are not confounding social capital with wealth effects. Taken together, the results are consistent with households being better able to diversify away their idiosyncratic risk in communities that suffered smaller numbers of aggregate negative shocks or in communities where there appears to be more social capital.

Robustness of the Results

There are a number of potential estimation problems with these results. In this subsection we present evidence to demonstrate that they are not altering the results significantly. The concerns include (1) attrition in the sample, (2) the endogeneity of reported events and valuations of those events, and (3) measurement error in the reported values, including recall bias.

Using data for the 1993 KIDS cohort, Alderman et al. (2001b) show that estimates of the height-for-age Z-scores of young children that account for attrition in the sample are not significantly different from those that do not. In the present work, the additional controls for household fixed-effects make it even less likely that attrition bias is driving the results.

Regarding endogeneity and measurement error in the shock information, it is important to emphasize that because of the household fixed-effects, only time- or child-

varying factors are potentially problematic.[12] So if a household has an unchanging (and additive) "propensity" to suffer more shocks, for example, this would be controlled for in the estimation.

As reported above, the present work included all types of shocks—a strategy that might mute the possible endogeneity biases caused by selecting only a few. We also considered a set of specifications in which we excluded the death and illness shocks that we think are the most problematic. When we do this, all results hold with one exception, the triple interaction of household losses, neighbors' losses, and community groups in the final column of Table 4 is no longer significant. Finally, in order to assess the possibility that changes in community services such as the introduction of health clinics are confounding the results, we consider a set of specifications in which in addition to the neighbors' measures from the household survey, we also include the community-survey-based shock measures. The results are unchanged.

As described earlier, there is a danger that recall bias favors reporting of more recent events. For negative events this means that the average size of shocks is increasing over time. We also know that height-for-age Z-scores are improving over time. Therefore, even if there were residual reporting bias after controlling for age, the bias for negative shocks would be in the downward (toward zero) direction. It may, however, be the case that the role of gains is being overstated due to this problem. To explore this, we

[12] While a potential remedy is instrumental variables estimation, due to the correlation among the various factors, this proved to be feasible to do only for household losses and gains on their own without also including the community shocks that allow us to assess the differential effects. In addition, even with very good instruments, it is unlikely that all the interactions could be successfully instrumented.

reestimate using only the more recent shock information from 1996 onward; the estimated effects on both gains and losses are very similar to those already reported, and no other results are significantly changed.

A final concern is random measurement error in the event reports and valuations. Where we find significant effects, this is less critical to the extent we do not want to rely on the coefficient point estimates. Of more concern, however, is the measurement of the aggregate shocks (both from the household and community surveys), since the finding that they are not important factors may be related to this. In particular, a possible criticism of the approach we have taken is that the communities are not well defined geographically.

On balance, then, while we would prefer not to make strong claims about the exact magnitudes of the estimated effects, it does not seem likely that the potential biases outlined above are substantially changing the qualitative results.

5. Other Risk-Coping Mechanisms

Households in KwaZulu-Natal, South Africa, live in an environment characterized by a variety of idiosyncratic and covariant risks, and many face significant probabilities of experiencing economic losses due to shocks that threaten their daily subsistence living standards. Before taking into account a measure of linkages or social capital within (and possibly across) communities, we find that idiosyncratic shocks appear to influence a key indicator of child nutritional status. The implication is that in

KwaZulu-Natal, unlike the idealized village community, some households seem unable to insure against such idiosyncratic risk.

For those who reported a negative economic event, several additional questions around possible coping mechanisms used were asked. They included whether assets were sold (26 percent), insurance was used (6 percent), money was borrowed (4 percent), or children were taken out of school (1 percent). The question most relevant for this research, however, was whether the household received help from others: this sort of assistance accompanied 20 percent of the negative events, concentrated in a somewhat smaller group of households, 13 percent.

Respondents were asked also about individuals who were economically linked to the household but were not household members, including individuals who might have been sending or receiving remittances, borrowing or lending land, etc. The household then reported whether it or anyone else would be able to provide assistance in an economic crisis. Forty percent of households were unable to identify any such person who could help; 40 percent, one such person; and the remainder, more than one person.

That households in KwaZulu-Natal are operating in somewhat narrow networks resonates with the finding that some households are unable to cope with idiosyncratic risks. When aggregate shocks and a proxy measure for social capital are introduced, however, there is a partial rescue of the informal insurance model. Households in communities with large losses are less able to cope with their own loss, consistent with informal support mechanisms being strained. Furthermore, households in communities

with more groups, our proxy for social capital, are able to weather idiosyncratic shocks more easily.

Investment decisions regarding the nutritional status of young children are only part of the typical households' portfolio of possible responses to adverse and favorable events. It may be that the findings reported here are the results of households behaving in a fashion to protect some other type of consumption or investment. Given its importance in the South African labor market and the extremely small number of households indicating they had coped with their loss by taking a child out of school, a likely candidate is education. Future work might focus on determining what other aspects of the household economy are being protected in the potentially dangerous trade-off with child health.

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