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Income risk, coping strategies and safety nets

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Income Risk, Coping Strategies and Safety Nets

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Abstract

High income risk is part of life in developing countries. Climatic risks, economic fluctuations, but also a large number of individual-specific shocks make these households vulnerable to serious hardship. For example, details are given on the various shocks and events causing serious hardship to rural households in Ethiopia in the last twenty years. Not surprisingly for Ethiopia, climatic events are the most common cause of shocks, but many households suffer from other common or idiosyncratic shocks related to economic policy, labour or livestock.

Rural and urban households in developing countries face substantial risk. Households in risky environments have developed sophisticated (*ex ante*) risk-management and (*ex post*) risk-coping strategies, including self-insurance via savings and informal insurance mechanisms while formal credit and insurance markets appear to contribute only little to reducing income risk and its consequences. Despite these strategies, vulnerability to poverty linked to risk remains high. In this paper, I focus on the opportunities available to households to use risk-management and risk-coping strategies, and on the constraints on their effectiveness, by reviewing some of the recent literature on savings as insurance, income diversification and smoothing, and informal risk-sharing arrangements. Risk and lumpiness limit the opportunities to use assets as insurance. Entry constraints limit the usefulness of income diversification. Informal risk-sharing only provides limited protection, especially for some of the poor and their sustainability during periods of change is in doubt. Public safety nets are likely to be beneficial, but their impact is at times limited while they may have negative externalities on households not covered by the safety net. The paper also discusses the implications for policy as well as the information requirements to increase our understanding of vulnerability and implement better vulnerability reducing policies.

Keywords: risk, consumption smoothing, risk sharing, safety nets

JEL classification: D80, H55, I38, O16, O17

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Introduction

Many other studies have reported high income variability related to risks of various forms. Using the 10-year panel data for one of three ICRISAT villages in India, Townsend (1994) reports high yearly yield fluctuations (in monetary terms) per unit of land for the dominant crops. Kinsey et al. (1998) report a high frequency of harvest failures in a 23-year panel of rural households in a resettlement area in Zimbabwe. Bliss and Stern (1982) provide an estimate for Palanpur, India: if the onset of production is delayed by two weeks, then yields decline by 20 per cent. Morduch (1995) provides many more other examples.

This paper reviews the strategies households and individuals use to avoid consumption shortfalls caused by risk. It draws on a growing empirical economic literature, mainly based on panel data studies, supplemented by my own work on Ethiopia. This is not the first survey on this topic – other examples are Alderman and Paxson (1994), Morduch (1995, 1999), Townsend (1995) and Fafchamps (1999). My focus is different from these studies as I attempt to focus on the constraints faced by households to use these strategies as well as on policies to strengthen the ability of communities, households and individuals to avoid serious consumption shortfalls due to risk. Most examples quoted in this paper are from Africa and Asia. Lustig (2001) contains relevant examples from Latin America. In the next section, I introduce the risk problem faced by households. In Section 2, I focus on asset strategies, while Section 3 reviews income-based strategies. Section 4 discusses informal and formal safety nets. Section 5 briefly reviews ways of defining and monitoring vulnerability to poverty.

Table 1
Risk-related hardship faced by rural households in Ethiopia

Events causing of hardship	Percentage of households reported to have been seriously affected in last 20 years
Harvest failure (drought, flooding, frost, etc.)	78
Policy shock (taxation, forced labour, ban on migration, ...)	42
Labour problems (illness or deaths)	40
Oxen problems (diseases, deaths)	39
Other livestock (diseases, deaths)	35
Land problems (villagization, land reform)	17
Assets losses (fire, loss)	16
War	7
Crime/banditry (theft, violence)	3

Source: Own calculations based on Ethiopian Rural Panel Data Survey (1994–1997).

1 Risk, household responses and consequences

Shocks can be idiosyncratic or common. Other characteristics matter as well in causing hardship or exacerbating the effect of shocks to income. The nature of the shock has implications for the ability to cope with its consequences. Income risk is caused by a variety of factors. Typically, common (aggregate, economy-wide, covariate) risk is distinguished from individual (idiosyncratic) risk: the former affects everybody in a particular community or region; the latter only affects a particular individual in this community. In practice, even within well-defined rural communities, few risks are purely idiosyncratic or common. Table 2 gives details on different events and shocks experienced by households in a three-period panel data set on Ethiopia in a data set. A large number of different shocks affecting income happen; most shocks have both idiosyncratic and common parts. (In the last two columns, the table gives measures of the extent to which the shock is 'common' to the households in the community. The lower the contribution of the village level variance to total variance, the more idiosyncratic the shock. The higher the F-statistic, the higher the contribution of village level shocks to total shocks.)

Other studies also find that the idiosyncratic part of income risk is relatively large. Deaton (1997) finds that common components for particular villages explain very little of the variation of household income changes within villages in the Côte d'Ivoire LSMS data for 1985–86. Townsend (1995) reports evidence from a Thai household data set, suggesting that there are few common regional components in income growth. The Indian ICRISAT-data suggest also relatively limited co-movement in incomes within the villages (Townsend 1995). Morduch (2001) suggests that idiosyncratic risk (inclusive of measurement error) accounts for 75 to 96 per cent of the total variance in income in these villages. Udry (1991) reports similar magnitudes for Northern Nigeria.

Other characteristics of income risk include the frequency and intensity of shocks, and the persistence of their impact (see also Morduch 1999). Relatively small but frequent shocks are more easily to deal with than large, infrequent negative shocks. Examples of the latter are disability or chronic illness; the former are events such as transient illness. Gertler and Gruber (1997) find that, in terms of consumption levels, households in their sample from Indonesia can only protect 30 per cent of the low-frequency health shocks with serious long term effects, but about 70 per cent of the high-frequency smaller health shocks. If there is some persistence in the effects of a shock, i.e. bad shocks have long-term consequences, then coping is more difficult. Theoretically, the effects of autocorrelation in income on buffer stock behaviour are explored by Deaton (1991). Using panel data from Pakistan, Alderman (1998) finds that with successive shocks, consumption smoothing is more difficult than with single shocks. Some shocks may have persistent effects: for example, health problems tend to have consequences that last.

Table 2
Shocks affecting income 1994–1995 (n=1450, 15 communities)

	1994a	1994b	1995	Village level variance as % total variance	F-test of Analysis of Variance**
Village rainfall (% above long-run mean)	0.06	0.12	0.12	100	
Rain index (individual, 1 is best) [§]	0.57	0.57	0.63	40.6	64.6
Non-rain shock index (1 is best), total index [§]	0.65	n.a.	0.80	28.2	37.2
Non-rain shock: low temperature, frost, storm, etc. [§]	0.71	n.a.	0.82	34.4	49.9
Non-rain shock: pests and diseases on crops [§]	0.59	n.a.	0.77	28.9	38.7
Non-rain shock: animal damage, trampling,... [§]	0.68	n.a.	0.85	30.9	42.6
Non-rain shock: weed damage [§]	0.29	n.a.	0.14	13.8	15.3
Crop index (best=1, 0 worst) [§]	0.33	0.65	0.43	34.0	49.1
Livestock affected by animal disease (1 is best) [§]	0.72	0.86	0.89	24.6	30.6
Livestock affected by lack of water and grazing land (1 is best) [§]	0.71	0.78	0.78	31.7	25.3
Number of days lost by adults in last month per adult	0.66	0.45	0.39	5.2	5.3
Adults died in last six months	n.a.	0.04	0.02	5.6	5.8
Lower harvest linked to not having labour due to illness	0.19	n.a.	0.13	15.9	17.8
Lower harvest due to not finding labour when needed	0.18	n.a.	0.13	14.4	15.7
Lower harvest due to not finding oxen at right time	0.40	n.a.	0.27	32.0	43.5

[§] Index based on reported problems. 1 means no problems reported. 0 means all possible problems occur. Rain index (individual) is based on problems for own activities from rainfall, including whether it rained during harvest, irregularly for own crops, etc. Crop index is based on reported moderate or serious crop failures.

* The results on the variance-decomposition are obtained allowing for time-varying village level means on the pooled data set across rounds. In practice, this village-level variance is the R^2 of a regression on a full set of time-varying village level dummies.

** The F-statistic of the analysis of variance associated with the importance of village level shocks. Note that all tests suggest significant village-level effects at 5 per cent. The higher the F, the higher the significance of the effects.

n.a. not available

Source: Dercon and Krishnan (2000a).

The nature of the shock is important to understand the possibilities to deal with its consequences. Idiosyncratic shocks can be insured within a community, but common shocks can not: if everybody is affected, the risk cannot be shared. Formal or informal insurance transfers (credit or insurance) from outside the community are necessary; intertemporal transfers (e.g. depletion of individual or community-level savings) are also possible.

Households do not just undergo the consequences of high risk. Households in risky environments have developed sophisticated strategies to reduce the impact of shocks. Alderman and Paxson (1994) distinguish risk-management from risk-coping strategies.¹ The former attempt to affect *ex ante* the riskiness of the income process ('income smoothing'). Examples are income diversification, through combining activities with low positive covariance and income-skewing, i.e. taking up low risk activities even at the cost of low return. In practice, this implies that households are usually involved in a variety of activities, including farm and off-farm activities, use seasonal migration to diversify, etc. or focus on low risk activities even at the cost of a low return. In Section 3, this is discussed further.

Risk-coping strategies involve self-insurance (through precautionary savings) and informal group-based risk-sharing. They deal with the consequences (*ex post*) of income risk ('consumption smoothing'). Households can insure themselves by building up assets in 'good' years to deplete these stocks in 'bad' years. This is the focus of Section 2. Alternatively, informal arrangements can develop between members of a group or village to support each other in case of hardship. These mechanisms are often observed operating within extended families, ethnic groups, neighbourhood groups and professional networks. In recent years, these mechanisms have been studied theoretically and empirically in variety of settings (see also Section 4).

Risk-coping strategies may also involve attempting to earn extra income when hardship occurs. Kochar (1995) reports increased labour supply as the key response in the ICRISAT villages. The literature on coping strategies when famine strikes also regularly report attempts to earn additional income through a reallocation of labour, including temporary migration, earning income from collecting wild foods (also for own consumption), gathering activities (such as increased firewood collection), etc. During famines in Ethiopia or Sudan, these responses were all observed. Other examples are in Corbett (1988)² (for more details, see Section 3).

¹ The World Development Report 2000/01 uses an alternative classification of strategies, taking the response to risk as its focus. It distinguishes risk reduction, risk mitigation and risk coping strategies. The classification used in this paper follows the economics literature and focuses on welfare outcomes, such as consumption and other dimensions, and distinguishes risk strategies on the basis of whether they take income as given or not (World Bank 2000).

² The social sciences literature on household strategies dealing with shocks often uses a different terminology. For example, Davies (1996) uses 'coping strategies' to describe strategies employed during crises, where coping suggests success in dealing with the crisis, while 'adaption' is a characteristic of a 'vulnerable' household, using 'coping' strategies as part of standard behaviour. Adaptive strategies are then defined as a permanent change in the mix of ways in which households make a living, irrespective of the year in question. For a good review, see Moser (1998). In this paper, we consider a framework in which households develop strategies to deal with contingencies. A distinction between adaption and coping seems less relevant. Any coping strategies will need ex-ante actions, such as forming informal networks, or building up savings. Consequently, all households will

Group-based insurance mechanisms are geared towards insuring idiosyncratic shocks, affecting some members but not to all. They obviously cannot provide insurance to deal with shocks common to all members. Self-insurance can, in principle, deal with any type of shock, as long as *ex ante* sufficiently large resources have been built up.

Formal credit and insurance markets appear to contribute only little to reducing income risk and its consequences. Informal credit and insurance, however incomplete, helps to cope with risky incomes. These high risks are not easily insured via formal market mechanisms. Credit and insurance markets are typically absent or incomplete for good theoretical reasons or linked to bad policy (for surveys, see Bell 1988 or Besley 1994, 1995). Consumption loans are rare. Nevertheless, traditional credit systems (Roscas, Susu, Tontines) often include a lending possibility, which may be used for consumption purposes. Formal loans or loans in microfinance programmes also often serve consumption purposes via their fungibility. Informal credit markets also appears to adjust to high-risk environments. Udry (1994) reports that informal loans in rural Nigeria appear to take the form of state contingent loans. Repayment is conditional on income outcomes of both borrowers and lenders: negative shocks are translated into more favourable terms for the agent experiencing them.

Despite these strategies, vulnerability to consumption shortfalls remains high. It is therefore clear that further development of safety nets will be necessary. Townsend (1995) noted that income variability remains high in the ICRISAT data for India: 'diversification and other income strategies are only used to a limited extent and in any case insufficient'. Risk coping strategies are also typically insufficient. Work on India estimates that transfers amount to less than 10 per cent of the typical income shocks (Rosenzweig 1988). Other studies also suggested imperfect risk-sharing or consumption smoothing (Paxson 1993, Chaudhuri and Paxson 1994, Deaton 1992, 1991, Morduch 2001, see also Deaton 1997 for several examples).

The experiences during the large famines in the Horn in the mid-1980s also illustrated the limitations of these coping strategies. Rahmato (1991) has documented in detail the complexity of these strategies, but the results were still dramatic. Dercon (2001b) reports that, in a sample of rural households, 10 years after the famine, cattle holdings were still only two-thirds of what they were just before the famine of the mid-1980s. Reardon et al. (1988) report that transfers in the aftermath of the 1984 drought were only equivalent to three per cent of the losses for the poorest households in the Sahel. Recent events in East Asia during the recent crisis also exposed the limitations of informal insurance and self-insurance. In Indonesia, for example, consumption poverty increased substantially, but even more important were the reductions in household investment in health and education, affecting future generations (see Thomas et al. 2001, Frankenberg 1999, Chaudhuri et al. 2001).

More generally, the failure to cope with income risk is not only reflected in household consumption. Effects on nutrition, health and education are also observed, as are intra-household consequences. Rose (1999) finds that in rural India negative rainfall shocks are associated with higher boy and girl mortality rates in landless households, but not in

have adapted their livelihood to serve their own objectives as good as possible – and whether this includes more or less 'traditional' coping strategies is *conceptually* irrelevant, although as will be seen, it has analytical and policy implications, e.g. regarding long-term incomes.

households with lots of land. Jacoby and Skoufias (1997) find that in South India (ICRISAT-villages) children are often taken out of school in response to adverse income shocks; the result is lower accumulation of human capital. Foster (1995) shows that child growth was affected during and after the severe floods in Bangladesh in 1988. He does not find evidence of a sex bias. But other studies find such a bias. Using ICRISAT-data, Behrman (1988) shows that the inability to smooth consumption implies that child health suffers in the period before the major harvest; girls are most affected. Behrman and Deolalikar (1990), using data on individual nutrient intakes from India, report that estimated price and wage elasticities of intakes are substantially and significantly higher for females than for males, suggesting that women and girls share a disproportionate burden of rising food prices.

Dercon and Krishnan (2000b) test risk-sharing within rural households in Ethiopia. Adult nutrition is used to investigate whether individuals are able to smooth their consumption and within the household over the seasons. Within poor households in the southern part of the country, households do not engage in complete risk-sharing between husbands and wives; women in these households bear the brunt of adverse shocks. An average loss of labour due to illness for a female in a poor, southern Ethiopian household results in a loss of 1.6 to 2.3 per cent of body weight due to the lack of risk-sharing.

2 Asset strategies

Deaton (1991) sets out the benefits of self-insurance via savings when credit markets are imperfect. In his model, the household maximises intertemporal expected utility. Instantaneous utility is concave and the individual has a precautionary. It can save, receiving a safe return on assets, which is assumed to be relatively low. Income is risky.³ Households are impatient, so that they have a preference to consume today rather than in the future. The result is that interest rates are lower than the rate of time preference. Deaton shows that if households are infinitely lived (a 'dynasty') then households will build up assets in good years to deplete in bad years. Assets will not be systematically accumulated to very large levels due to impatience. We observe high frequency fluctuations in savings, consumption smoother than income, even though it is still possible that, after bad luck in the form of sequence of bad draws, consumption is very low, i.e. a deep crisis is not easily insured. Deaton plausibly argues that for many developing countries, this model fits well with some of the stylised facts of occasional low consumption, low asset holdings and high frequency of asset transactions.

However, it is not easy to draw immediate policy conclusions from this work, except for developing credit and insurance markets, which, as is well known, face inherent problems not easily addressed by interventions (Besley 1994). In a way, the key result – imperfectly smooth consumption – follows largely from the impatience of households: if only they were patient, they would build up sufficient assets to cope with future stress.

³ In the basic model income is also independently, identically distributed, but this assumption is relaxed in further simulations.

To understand household savings behaviour in risky developing countries environments, one needs to acknowledge that assets are risky, not safe. Deaton's model assumes that savings can occur in a safe form with a positive rate of return. In practice, this may not be possible. The lack of integration of asset markets and difficulties that face the poor in obtaining access to the better (internationally traded) assets and securities means that the portfolio of assets available to the poor is far from ideal. When a common negative shock occurs, incomes are low and returns to different assets are also low – often even negative. As a consequence, just when assets are needed, net stocks could be low as well. For example, if assets are kept in the form of livestock (as they are commonly throughout most of the developing world!), then during a drought not just are crop incomes low, but some livestock may die and fertility will be low. The consequence is a smaller herd or even loss of all livestock, just when needed as part of the self-insurance scheme.⁴ Similarly, stock market returns may be low when crisis hits an economy – as the experience in Asia during the recent crisis has shown. To the extent that some of these stocks are kept for precautionary motives, similar effects occur.

The likely covariance of asset values and income due to common shocks makes self-insurance a far less useful strategy than it seems. Another form of risk related to assets is not so much related to the return per se, but to the terms of trade of assets relative to consumption. If a negative common shock occurs, households would like to sell some of their assets. However, if everybody wants to sell their assets, asset prices will collapse and the consumption that can be purchased with the sale of assets will be lower. Similarly, when a positive shock occurs, all will want to buy assets for future protection, but then prices will be pushed up. In all, self-insurance becomes far more expensive as a strategy.

There is a lot of evidence, albeit some of it anecdotal, that this is indeed common occurrence. During the famine in Ethiopia in 1984–85, terms of trade between livestock and food collapsed – relative food prices became three times higher than usual, reducing the purchasing power of assets by two-thirds. In recent times, house prices in Indonesia and other Asian economies have collapsed after a boom during the early 1990s. Note that the same occurs following positive shocks. Bevan et al. (1991) reported on the construction boom taking place during the coffee boom in the mid-1970s in Kenya: prices for construction materials and other durables increased considerably. Households tried to put some of their positive windfalls into more assets, but their choice set was strongly restricted due to the macroeconomic policies.

Access to relatively safe and profitable assets, which might be useful for consumption smoothing, may also be limited. Lumpiness in assets may be a reason why the poor cannot protect themselves easily via assets. While risk in returns and terms of trade may limit in certain circumstances the use of assets to smooth consumption, there are examples where assets contribute to consumption smoothing. Rosenzweig and Wolpin (1993) have shown that bullock sales contribute to consumption smoothing in the South Indian ICRISAT villages, although Lim and Townsend (1994) argue that crop inventory appears to be the main strategy. Access to assets for smoothing may however not be self-evident. For example, buying and selling cattle is generally recognised as a

⁴ Note that this type of risk in returns to assets are not limited to commodity-based assets. The risk of bank bankruptcy and a run to withdraw deposits during economic crisis means that seemingly safe assets are in fact also risky with covariate returns with incomes.

common strategy to cope with income fluctuations in many rural areas (Binswanger and McIntire 1987, Davies 1996). However, a relatively large proportion of households often do not own any. Dercon (1998) finds that only half the households in a sample in Western Tanzania own cattle, even though cattle are important in the farming system and in their culture. The explanation is not that the others simply choose to enter into other activities; rather, investing into livestock requires a sizeable surplus: livestock are lumpy. A cow, for example, costs about a fifth of mean crop income. Cattle ownership is generally determined by endowments in male labour and land, suggesting that those with a poorer endowment cannot generate sufficient means to enter into cattle rearing, leaving them relatively more exposed to income risk.

The consequences of risky or lumpy assets are easily illustrated via simulations. Box 1, based on Dercon (2000), gives some results. Risk in asset returns, terms of trade risk and lumpiness have substantial impacts. The largest effects stem not from risk per se, but from the covariance between asset values and income. Positive covariance is not unrealistic: when an economy-wide shock occurs incomes are likely to decline but so also will asset values. This results in a large reduction in the opportunity to effectively self-insure.

Box 1

Simulations of the consequences of income and asset risk

In Dercon (2000), simulations are reported to illustrate the consequences of asset risk and lumpiness in assets for the usefulness of savings to buffer consumption. Assuming some reasonable values for the parameters of an extension of model similar to Deaton (1991), the paper calculated the risk premium (what one would be willing to pay in the first period to avoid risk) using different assumptions about assets. In particular, a 20-year horizon was assumed, as well as logarithmic utility, risky income with mean 50 and a standard deviation of 10, a rate of time preference and an expected interest rate of 5 per cent. Without access to credit, insurance or savings, the risk premium was 19.8 per cent of mean income. This can be seen as the benchmark – a measure of the risk that needs to be covered. Expressing the risk premium in each case as a percentage of total risk provides a measure of how much risk remains uninsured; one minus this value is a measure of how well self-insurance works. With safe assets, this was 67 per cent: or two-thirds of the total consumption risk is insured if households have access to safe assets and use them optimally. Asset returns risk (introduced as returns with mean 5 per cent and a coefficient of variation of 0.2) reduces this marginally to 65 per cent. However, if the correlation of incomes and assets is 0.5 – covariate risk – then this drops to 58 per cent. Covariance in terms of trade is far more problematic. If asset prices are risky (coefficient of variation of 0.2), then with price risk independent of income risk, self-insurance can only cover 50 per cent of the total risk premium. However, positive covariance (with a correlation coefficient of 0.5) reduces this to 16 per cent. Furthermore, introducing lumpiness in the assets – so that they need to be bought in units of 10 – reduced this further to only 5 per cent. In short, terms of trade risk, especially if it is covariate with income, and lumpiness rapidly reduce the usefulness of self-insurance via savings.

There is some evidence of household behaviour consistent with these predictions. During the 1984–85 famine, households in Ethiopia were observed rather to cut their consumption to dangerously low levels rather than sell their assets, when asset terms of trade had totally collapsed. This is consistent with the model described above: the return in terms of consumption of keeping on to their assets is very high, since at present very little consumption can be obtained. Czukas et al. (1998) present evidence consistent with this model. They find that livestock sales (both cattle and small stock) combined offset at most 30 per cent, and probably closer to only 15 per cent of the crop income shortfall endured during severe drought.

Policies that influence asset market risks could be beneficial to households attempting to deal with shocks. Policies could include providing more attractive and diversified savings instruments. Microfinance initiatives should put savings for self-insurance on the agenda. Macroeconomic stability during income downturns would also allow self-insurance to function better. Providing households access to better, a larger set and less risky assets should avoid some of these problems. Integrating asset markets with the wider economy could avoid much of the often-observed covariate movements in asset prices and incomes. For example, if in rural Africa or India, holding other assets, such as low cost financial savings via post-office accounts etc. could be facilitated, then communities could use alternatives to animals to store wealth. Introducing a focus on savings for self-insurance in the booming number of initiatives related to microfinance operations could be of help.

The terms of trade risk between assets and consumption is of particular concern. This has partly to do with macroeconomic stability. For example, terms of trade declines often coincide with consumer price increases relative to asset prices (e.g. in the famines in Bangladesh in 1974, in Ethiopia in 1985). Low inflation and exchange rate stability could reduce these large shocks in relative prices when incomes are low. Policies that limit the macroeconomic impact of common shocks would enhance self-insurance.

3 Income smoothing strategies

In this section, I consider income smoothing, i.e. strategies which reduce the risk in the income process. Often, the strategy considered is diversification of income sources. Theoretically, as long as the different income sources are not perfectly covariate (i.e. they have a correlation coefficient below 1), then there will be a reduction in total income risk from combining two income sources with the same mean and variance. Stated like this, there appear to be no costs involved: mean income is the same. It is therefore useful to consider also another income-based strategy, in which mean income is reduced to obtain lower risk. One could refer to this as income-skewing: resources are allocated towards low risk-low return activities. In the extreme, this will not show up as diversification: the poor may well be more specialised in a low risk-low return activity. In this section I will discuss how effective income smoothing is, and the determinants and costs of diversification and income skewing.

Widespread diversification of income sources is commonly observed in developing countries. However, in practice relatively little income smoothing is achieved by poorer households via this route. Many studies have emphasised the extent to which households diversify income sources. Across the developing world, farm households achieve a substantial share of income from non-farm activities. Reardon et al. (1994)

report an average share of 39 per cent in across eight countries in rural West Africa. Besides non-agricultural activities, households fragment their land holdings into many plots, grow different crops or engage in local farm wage employment. But is diversification effective in practice? Townsend (1995) suggests that in the ICRISAT villages in India, substantial scope for diversification exists, but in practice relatively little takes place. Or at least, income remains highly variable.

Why does diversification not always result in income smoothing? First, it should be emphasised that, contrary to the impression created, combining different income sources is not always meant to handle risk. For example, different activities may be conducted at different times (e.g. seasonal activities), providing income across the year by serving to smooth labour over time. Second, while in 'normal' years farm and off-farm activities may be relatively uncorrelated during crises, they may move together. Since downturns could be severe, this would severely limit the use of diversification. There is evidence that this is the case. Czukas et al. (1998) find evidence that non-farm income is positively correlated with shocks affecting crop income: drought adversely affects not only crop income but also non-farm income. They refer to Sen's analysis of famine – crop failure leads to a collapse of the demand for local services and crafts, limiting the use of diversification to handle risk.

There are also important constraints on entering into profitable and risk-reducing diversification. Non-agricultural activities or profitable alternative agricultural activities are not accessed easily. Most effectively-risk-reducing activities with a reasonable return cannot be easily entered. Entry constraints could take the form of working capital needs, skills requirements etc. (e.g. Reardon et al. 1988, Reardon 1997). Dercon and Krishnan (1996) look explicitly at the role of different constraints to enter into activities in Tanzania and Ethiopia. They find that the poor typically enter into activities with low entry costs: firewood collection, charcoal, collecting dung cakes, casual agricultural wage employment, etc. Entry into high return non-crop activities, such as cattle rearing or shop keeping, is restricted to richer households, presumably with access to capital. Non-agricultural wage employment is restricted to those with education. When asked, most households would like to invest into cattle rearing and to a lesser extent, trade and business. More recent data from Ethiopia on non-farm business activities and the investments typically needed to enter into these affected seems to confirm the relatively high capital needs for some activities. While some activities require virtually no investment, others where quite costly. Median investment into charcoal making, dungcakes collection, handicrafts, weaving or food processing was between 0 and 20 birr (US\$ 3), but the returns to these activities are relatively low. More lucrative activities, such starting a shop, entering into livestock trade or transport services required 300 to 550 birr (about US\$ 45 to 80). A mature cow costs about 400 birr (US\$ 60). These are large sums in an economy with mean per adult income below US\$ 200 (own calculation from data from Ethiopian Rural Household Survey 1995). Dercon (1998) looked further at the evidence on whether activity choice towards high return activities in rural Tanzania is affected by entry constraints or by comparative advantage, and finds the former far more relevant. Risk considerations matter as well, but only forcing the poorer households to enter into low return activities. This leads us to the next point.

Income risk reduction often comes at a cost. The long-term consequences for the asset-poor are lower average incomes and a higher income gap relative to asset-rich households. Profitable or mean income preserving diversification is therefore not easily

possible. Collier and Gunning (1999), building on the evidence discussed above, suggest that the poor have to enter into low return-capital extensive activities, since high return activities require capital. The poor are less diversified despite facing more serious consequences of bad income draws with limited insurance and credit market imperfections. The implication is that many diversification or income skewing strategies are actually mean income reducing, making them less interesting for households: lower risk will have to be weighed against low returns, providing another reason for the limited income smoothing achieved in practice.

Another implication is that income-based strategies are directly linked to asset-based strategies (and other forms of protections offered, such as by informal insurance). As analysed by Eswaran and Kotwal (1989), credit can serve as insurance substitute but credit market imperfections usually imply collateralised lending. The consequence is that asset-poor households cannot enter into high-risk activities, since downside risks are too high, while asset rich households do not face this problem. Those with access to (liquid) assets can borrow in times of crisis, or if credit is absent sell them as part of a buffer stock strategy. To handle income risk, asset-poor households will have to enter low-risk, low-return activities. The consequence is further impoverishment, or at least increased inequality.

There is evidence that this indeed is happening. Morduch (1990), using the ICRISAT sample, shows that asset-poor households devote a larger share of land to safer traditional varieties of rice and castor than to riskier but high-return varieties.⁵ Dercon (1996) finds that households with limited liquid asset (livestock) grow proportionately more sweet potatoes, a low-return, low risk crop in an area in Tanzania. A household with an average livestock holding has a proportion of land allocated to sweet potatoes which is 20 per cent smaller than for a household with no liquid assets. The return per adult is 25 per cent higher for the crop portfolio of the wealthiest group compared to the poorest quintile. Choosing a less risky crop portfolio has substantial consequences for incomes.

Rosenzweig and Binswanger (1993) suggests that the portfolio of activities (and investments) in the ICRISAT villages in India is affected by high risk. Increasing the coefficient of variation of rainfall timing by one standard deviation would reduce farm profits for the poorest quartile by 35 per cent; for the richest quartile the effect is negligible. Efficiency is affected and average incomes of the poor are reduced. Wealthier farmers are not affected and achieve therefore higher incomes. The long-term wealth distribution is affected: 54 per cent of wealth is held by the top 20 per cent of households. Jalan and Ravallion (1998) have other examples, although their evidence is more mixed.

Note that these results do not follow from differences in risk preferences. Controlling for preferences, the poor select a low risk-low return portfolio, while the rich take on a more risky set of activities. The results are related to the constraints on the options available to households. Kochar (1995) states, for example, in the Indian ICRISAT-villages 'the set of options faced by farmers offers little role for preferences' (p.159).

⁵ Note that he finds a significant effect on plot diversification but not on a crop diversification index, which may well be linked with some of the points made above.

Finally, several income-based strategies are only invoked when a crisis looms. These (income) ‘coping’ or ‘survival’ strategies are especially important when the shock is economy-wide. When a large negative occurs, the usual household activities may not yield sufficient income. If all households in a community or region are affected, local income earning activities are unlikely to be sufficient. Examples of these crises are droughts and floods, but also large economic shocks, such as those which affected parts of Asia in recent years.

Kochar (1995) argues that labour supply adjustments, rather than asset or other strategies, are the main strategy used by households in India to cope with negative idiosyncratic shocks. Increased labour force participation in response to economic shocks is also found elsewhere. Moser (1998) reports increased female labour market participation and child labour in communities in Ecuador and Zambia (p.8). Jacoby and Skoufias (1997) find that in the Indian ICRISAT villages, children are taken out of school in response to adverse income shocks to work, resulting in low human capital accumulation. Both female labour adjustment and withdrawal of children from schools were found to feature in the strategies used by households in Indonesia to limit the impact of the recent crisis (Thomas et al. 2001, Frankenberg 1999). During a deep crisis, such as during a famine, additional action is often taken to prevent destitution. Rahmato (1991), Corbett (1988), Davies (1996), De Waal (1987) report many examples, including temporary migration for jobs, longer working days, collecting wild foods, collecting forest products for sale such as firewood, etc.

To conclude, diversifying income sources is useful but for the poor it may come at a high cost. Observing specialisation does not necessarily imply that the household follows a high-risk strategy. Also, entry constraints may limit the diversification that can be achieved, leaving only low return activities free to the poor. Income portfolios must be seen in relation to the asset portfolio and other options available: a risky, specialised portfolio may mean lower consumption risk than a diversified portfolio, depending on the asset position. The policy implication is that ‘just’ promoting diversification is not necessarily a solution – finding ways of reducing entry constraints into profitable low risk activities is crucial.

4 Informal risk-sharing and safety nets

Beyond income-based strategies and self-insurance, households use a variety of informal risk-sharing arrangements to cope with the consequences of risk. Typically, they involve a system of mutual assistance between family networks or communities. There has been increasing interest in the empirical analysis of informal risk-sharing and theoretical modelling on the sustainability and consequences of these arrangements (see Morduch 1999 for a more detailed review). Central questions addressed in the empirical literature have been whether there is any evidence of complete risk-sharing both in communities in developing country as in a wide variety of settings, including the US and how (partial or complete) risk-sharing is obtained. The tests have generally found that complete risk-sharing has to be rejected, including in the US, in communities in India, in extended families in the PSID or even within nuclear households in Ethiopia (Townsend 1994, Hayashi et al. 1996, Dercon and Krishnan 2000b). Nevertheless, the evidence is consistent with partial risk-sharing.

These studies tend to test the presence of outcomes similar to those obtained by risk-sharing, although the tests cannot distinguish results due to self-insurance (i.e. accumulating and depleting assets) and informal insurance (or insurance-like behaviour, via transfers or credit). Nevertheless, there is evidence of partial risk-sharing via transfer behaviour in different countries or state-contingent ('quasi')-credit. Udry (1994) present evidence on state-contingent loans in northern Nigeria. Lund and Fafchamps (2000) show that loans and transfers within networks play an important role in risk-sharing. Grimard (1997) ordered the LSMS Côte d'Ivoire data by tribe and appears to find more stable consumption by tribes than for the full data set, suggesting that tribal networks allow smoothing over space, including via transfers. Full risk-sharing is rejected, however.

More direct evidence on the extent of risk-sharing also shows its limitations. Using detailed data on Northern Ghana, Goldstein et al. (2001) have shown that many idiosyncratic shock are not insured via community contacts or even spouses. De Weerd (2001) uses a detailed survey of all networks in a village in Tanzania that poorer households have fewer contacts to turn to in times of need, and typically poorer households can only rely on other poor households, not rich ones.

These limitations of risk-sharing arrangements are also mirrored in theoretical work. Hoff (1996), for example, has highlighted the possible negative consequences of informal risk sharing on poverty. Fafchamps (2001) discusses the persistence of inequality and patronage linked to risk-sharing arrangements. Another part of the theory literature has been on the nature and sustainability of (partial or complete) risk-sharing arrangements given the lack of formal enforcement (Coate and Ravallion 1993, Platteau 1997, Ligon et al. 2001, Attanasio and Rios-Rull 2000). Ligon et al. (2001) show evidence that the constrained risk-sharing model fits the ICRISAT-data for India better.

Still, even if imperfect, for many poor households in developing countries these are crucial networks helping them to cope with misfortune. Such groups can only insure idiosyncratic shocks, not common shocks. It would then be tempting to suggest that other means should be used to insure common shocks – savings or public safety nets should be developed to cope with these risks, as well as encouraging more protection against idiosyncratic shocks, not covered by communities. However, the consequences of these alternatives should be well understood.

Much attention has been paid in the public transfer literature to the problems of crowding out: the impact of public transfers for the poor is typically smaller than the total transfer, since net private transfers to the poor are reduced (for a discussion, see Cox and Jimenez 1992). Crowding-out of informal arrangements is also possible when public safety nets are introduced. Given the imperfection of informal arrangements alluded above and if the safety net provides full protection to all vulnerable households and individuals, this is hardly a serious problem from a welfare point of view (even if the cost may be high). However, the problem is more complicated in the case of self-sustaining informal arrangements where enforcement is not self-evident, and if safety nets provide targeted support.

The problem of sustainability involves that certain households may have incentives to leave the arrangement if they feel that staying in the arrangement – supporting others when the going is good to receive support when the going is bad – may not be in their interest. For example, if individuals have a series of lucky income draws then they may

rather keep this money and invest to better themselves than use it to support others. Also, if some households in the network have access to a new source of risk reduction or protection, then the arrangement may come under pressure. Sometimes renegotiating the reciprocal arrangement may allow the arrangement to continue, albeit on other terms; alternatively, the arrangement may break down (Platteau 1997, Ligon et al. 2001).

Public safety nets involve such a change of circumstances that may have undesired welfare effects. Information, budget or other constraints often result in the exclusion of some 'needy' households, even if targeting methods, including self-targeting are being used. This may result in specific type of crowding-out. Some households covered by the safety net may have incentives to leave their informal risk sharing arrangements, leaving other households less protected. Note that this implies negative externalities from the safety net: some households are more vulnerable due to the introduction of a safety net for others.⁶ Finally, this problem is not just limited to public safety nets: any policy intervention that improves an individual's position outside a private group-based informal risk-sharing arrangement may provide incentives to break down the informal arrangement (Ligon 2001, Dercon and Krishnan 2001). This concern is largely an empirical issue. Some have suggested that this form of crowding out is large (e.g. Albarran and Attanasio 2001). The most important point at this stage is, however, to acknowledge that one cannot take for granted that informal schemes dealing with idiosyncratic risk will not be affected by other interventions, including better functioning safety nets for common shocks or support for more self-insurance activities.

To avoid these problems, schemes that target groups rather than individuals, e.g. employment schemes for the group or the whole community involved in an informal scheme may be more appropriate. This of course requires detailed information about the informal schemes operating. An alternative could be to encourage and support groups involved in informal insurance arrangements to develop group-based self-insurance mechanisms. Indeed, the standard distinction that individual-based self-insurance can deal best with common shocks, while informal arrangements are suitable for idiosyncratic shocks, is misleading. Groups have incentives to self-insure as well, especially if there are economies of scale in asset holdings (e.g. transactions costs, opportunities for risk-pooling of assets, etc.). Groups could build up assets in good years to deplete in bad years, for the benefit of its members by using transfer rules and mechanisms parallel to the risk-sharing arrangement for idiosyncratic shocks.⁷ Policy interventions could provide incentives for this type of behaviour. Better savings instruments, access to banking, but also macroeconomic stability would assist this process. One could also endeavour to include a more important savings-for-insurance

⁶ In fact, this may even happen if everybody is covered by the safety net. Attanasio and Rios-Rull (2000) analyse this case and consider the consequences of introducing a safety net to deal with common shocks. Since the insurance of some part of the total risk faced by households improves the households' autarky position, it is possible that more than one-to-one crowding out occurs and total welfare is reduced by the safety net. Note that self-targeted schemes may not necessarily solve the problem: they also affect the individuals' outside option. Of course, the lower the payments in the scheme, the less they will affect the enforceability constraints. This is simply equivalent to providing lower insurance.

⁷ Indeed, in some traditional societies, this type of group behaviour was common. An example could be found in Western Tanzania (Sukumaland), where a community food stock, run by the village head, provided protection for the village when a large-scale crisis occurred.

element in group-based credit programmes, a current favourite in donor interventions. Note nevertheless that group-based targeting and insurance schemes have their own problems (Conning and Kevane 2001, 2002).

5 Monitoring income risk, vulnerability and coping strategies

The presence of serious income risk and its limited success to smooth shocks has implications for poverty measurement. Income as a measure of welfare to identify poverty has long been recognised to be problematic. As an alternative, current consumption, as found in cross-section surveys, has been used for most quantitative poverty analysis. The argument is that consumption is smoother than income and due to concavity of utility (risk-aversion), households have strong incentives to keep consumption smooth. However, the combination of high income risk and the observed inability of households to keep consumption smooth via risk-management or coping strategies, especially when a serious shock hits them, would suggest that alternative measures are needed.⁸

If inter-temporal data are available, dynamic poverty definitions can be used. For example, if data are available on consumption over time, it is possible to take into account that some households may only be poor in some years due to risk.⁹ One could distinguish those that are poor in each period from those that are poor in only some of the periods sampled. In all panel data sets on developing countries currently available, the large consumption fluctuations in the data result in a large number of the households moving in and out of poverty. For example, in the Indian ICRISAT data set, about 25 per cent of the poor in each period move out of poverty in the next period. Gaiha and Deolalikar (1993) reported that only 12 per cent of households were never poor. Jalan and Ravallion (2000) reported that about half the poor in each year were not poor on average in their sample from Rural China. Using data from rural Ethiopia, Dercon and Krishnan (2000a) report that while poverty remains largely the same on average between 1994 and 1995 at about 40 per cent, about a third of the poor are different households in each year. More evidence can be found in Baulch and Hoddinott (2000) and other articles in this special issue of *Journal of Development Studies*.

One needs to be cautious when interpreting the evidence on widespread poverty transitions and fluctuations. Measurement error in the data would show up as increased movement above and below the poverty line, increasing the apparent mobility. Still, since most studies quoted above can find variables correlated with the fluctuations, which are unlikely to be correlated with measurement error in consumption, it is likely that a substantial part of the observed consumption fluctuations are genuine.

⁸ Note that this is not just a problem for consumption poverty but also for other non-monetary dimensions of poverty. Alternative welfare measures, such as nutrition, food expenditure, expenditure on specific commodities (such as health or education), and even measures such as health or enrolment into schools would suffer from the same problem. For evidence on the impact of risk on education and nutrition, see Jalan and Ravallion (1998), Jacoby and Skoufias (1997), Dercon and Krishnan (2000b), Foster (1995).

⁹ Note that risk does not need to be only reason for poverty fluctuations: if credit and asset markets are imperfect, even predictable fluctuations in income may cause consumption and poverty fluctuations. An example is seasonality.

Ravallion (1988) has proposed a means to capture the distinction between chronic and transient (including risk-related) poverty. Using consumption as the underlying welfare measure, the chronically poor are those with average consumption below the poverty line. Transient poverty for an individual is the average poverty over time of this individual minus chronic poverty. Additive poverty measures can then be decomposed into a transient and chronic part. For example, using the squared poverty gap, Jalan and Ravallion (2000) report that roughly half of total (inter-temporally aggregate) poverty in their Chinese rural panel data set covering 1985–90 is contributed by transient poverty. They find that transient poverty is highest for those with average consumption near the poverty line and about 40 per cent of transient poverty is found among those not poor on average. But almost all transient poverty is for households whose mean consumption is no more than 50 per cent above the poverty line. This evidence implies that in any given year, the measured poverty level will exclude some that are at risk to be poor in the near future.¹⁰ Some of the non-poor tend to have relatively high average consumption over time (but within bounds).

Dercon and Krishnan (2000a) look explicitly at the link between shocks and poverty transitions, using panel data from Ethiopia. They use a fixed-effects model of consumption in which changes in consumption are linked to idiosyncratic and common shocks, such as rainfall shocks, a series of other crop shocks, illness shocks, shocks to livestock, etc. They find some of the fluctuations appear to be seasonal responses to prices and labour requirements. Nevertheless, shocks matter. Most areas in the sample experienced a fairly good harvest in the sample period. In the best period of the year (the post-harvest period) they find actual poverty of about 33 per cent; in the worst period about 40 per cent. Using the model and the shock information, they find however that depending on how good the year is, poverty in the post-harvest period could be up to 60 per cent in the worst period. In other words, given current coping opportunities, a large percentage of the population would be poor in a bad year, substantially larger than current poverty estimates from the (relatively good) 1990s would suggest.

Measures of vulnerability to poverty, as distinct from current poverty, are being developed. Work on poverty dynamics, including on transient poverty has highlighted the limitations of current static poverty measures. However, these alternative approaches remain backward-looking: they describe the past consequences of shocks and fluctuations. While information on the characteristics of those experiencing poverty transitions may assist in identifying those most at risk for consumption shortfalls, this is not quite the same as measuring vulnerability to poverty. Such a measure should be *ex ante*, i.e. forward-looking. One could define ‘vulnerable households’ as those liable to fall under an agreed poverty line over time with a particular high probability (for example more than 50 per cent or more than the current poverty rate).¹¹ Measures are proposed in Christiaensen and Boisvert (2000), Chaudhuri et al. (2001), Pritchett et al. (2000), Alwang, et al. (2001). More in general, beyond a headcount of vulnerability, one could construct measures of vulnerability for different dimensions of poverty (such

¹⁰ Or, to put it more correctly, given that Jalan and Ravallion (2000) use the squared poverty gap (P_2), the non-poor in any given year will contribute to poverty in other years.

¹¹ This means that some non-poor may well be classified as vulnerable, and some currently poor may not be vulnerable to future poverty.

as health or nutrition); or measures taking into account the extent to which households are likely to fall below the poverty line (Kamanou and Morduch 2001).

Targeting assistance to vulnerable populations requires specific kinds of information. Vulnerability measures and profiles based on these measures could be helpful for better policy design. Some have proposed measures purely based on cross-section household data (Chaudhuri et al. 2001), but the assumptions needed to identify common and idiosyncratic risk are very strong. Panel data have the advantage that recent shocks and responses to risk can be modelled, while households less able to cope with risk can be identified. This can form the basis for measuring and analysing vulnerability. (Dercon and Krishnan 2000a, Amin et al. 1999, Kamanou and Morduch 2001). The quantitative analysis of the success and failings of existing risk-reducing strategies by household is highly data-intensive, requiring detailed panel data. Most analysis published in the economics literature on risk and its consequences in developing countries is based on a handful of data sets, with most stylised facts entering into textbook development economics based on the three villages in South India, covered by ICRISAT. It is not realistic to expect this detail for a large number of countries in the developing world.

While more work is no doubt needed on detailed panel data sets, household surveys, including cross-sections, could be used to derive some measures and insights about vulnerability and the strategies used by households. In particular, most panel data studies find that vulnerability to shocks is closely linked to assets in the form of human and physical capital. In many ways, these are similar factors as typically highlighted as determining long-term poverty, although analysis has suggested that the extent to which they matter is usually different. Households with limited land holdings, with few assets that can be liquidated and with limited education typically are most affected by the consequences of income risk. This is reflected in a lower mean level of consumption (due to consumption risk averting actions, such as income skewing) or higher consumption fluctuations. Most cross-section household surveys contain information on physical and human capital, although in recent years, some of the instruments promoted for monitoring welfare changes appear to have been cutting back on these measures.

The total value of assets alone may not provide sufficient information on the ability to use self-insurance. Important questions also relate to the liquidity of assets – can they be sold if needed? Furthermore, they may lose their value during a crisis due to covariate risk, as the discussion in Section 2 has shown. Consequently, current asset values may not provide a good indicator for the effectiveness of the asset to buffer consumption. At least, information is needed on the functioning of asset and food markets as well.

Information on physical and human capital may not be enough for another reason. In the discussion in Section 3, it was argued that households may face constraints to enter into profitable diversification. Existing research suggests that physical and human capital are crucial determinants for entry into these activities. However, at the same time opportunities must exist to exploit these activities. Well-functioning markets, helped by infrastructure, roads and a demand for these products are just as important; general economic policies matter as well. It may well be possible that physical capital or skills are available, for example, to enter into handicrafts or trade, as part of a coping strategy,

but some areas may just be too remote to enter into them profitably. In short, information on opportunities available is just as important.¹²

Note that entry constraints and incentives to skew income towards low-risk activities imply that indexes measuring the degree of diversification (e.g. the number of activities, the share of off-farm income, etc.) are unlikely to be a good measure of vulnerability. For example, there is also no reason why a household specialised in a low risk activity faces higher risk than a household having a diversified portfolio of two very risky, correlated activities. Furthermore, it is important to look at the income portfolio in conjunction with the other risk-coping strategies: assets for self-insurance and informal insurance. Indeed, one important lesson from the literature surveyed is that the degree of diversification will be endogenous to the other strategies used, including self-insurance, irrespective of constraints on diversification.

In short, data on physical and human capital, combined with information on the functioning of and opportunities in product, labour and asset markets could provide a good basis to identify vulnerable households. Standard household surveys, including cross-section surveys, may contain a substantial part of the relevant information at the household level.

Data collection on household involvement in informal insurance systems is also necessary to analyse household vulnerability to poverty. The lack of such information is an important shortcoming of most standard household surveys. Nevertheless, understanding vulnerability and designing interventions to address these problems require information on the networks households can fall back upon. It is possible to include in household survey questions about the association of the household with others, and whether any insurance element is included. Observed transfers and other linkages may be one option; direct questioning on opportunities available to ask for help in times of crisis is another (examples are in De Weerd 2001, Dercon and Krishnan 2000a, Goldstein et al. 2001). A simple enumeration of the presence of networks may be useful, but care has to be taken to interpret any linkage or network as a proof for the existence of informal insurance mechanisms. Insurance and support networks definitely form part of social capital, but all social capital cannot simply be reduced to have insurance purposes.

Finally, a full description of the opportunities available to households to cope with shocks requires also information on the available formal safety nets. Any formal safety nets, for example, as part of a social security policy, is relevant and needs to be taken into account for monitoring vulnerability or designing policy initiatives. The existence of public employment schemes and the way they function need to be taken into account. For example, not just the amounts of support offered is relevant, but also their timeliness, targeting and overall impact on household vulnerability needs to be looked at. The available evidence suggests that the impact may at times be more limited than anticipated (Barrett et al. 2001, Dercon and Krishnan 2001).

¹² A good example is the 'traditional' coping mechanisms with a localised drought in Ethiopia. During the drought in Northern Ethiopia in 1984–85, households could not fall back on one of their typical strategies, temporary migration to look for work, because there was a ban on casual wage labour imposed by the government, while the war effort made anyone travelling suspect. The consequences are well-known.

The study of different forms of capital and the opportunities available to use them to reduce consumption risk can be enhanced by relatively simple, but revealing evidence on the experience of households during shocks, whether idiosyncratic or common. In particular, it is useful to ask households shocks they have experienced in recent years and how they handled these crises. This would include questions on the shocks they suffered and its overall impact, whether they have adjusted their income generating activities, how they have used their assets and whether they could rely on other people to support them during the crisis. Similarly, one could investigate how households would respond if particular shocks hit them now. While qualitative in nature, these direct questions, combined with information on assets could provide rich information on existing strategies to cope with risk and could inform appropriate policy design. Examples are in Tables 1 and 2 above, or in Udry (1994), De Weerd (2001), Goldstein et al. (2001), Townsend (1995).

Economic reform programmes are not exogenous to the risk management and coping strategies employed by households. They are bound to affect the opportunities and the ability of households to cope with risk, and not necessarily just in a positive sense. While more economic opportunities or better functioning asset and product markets are likely to strengthen these strategies, they may also expose households to other risks, for example, changing price risk or different risk in public service delivery. Such analysis is rarely implemented even though it is important. Even newly introduced safety nets may have such complicated impacts, for example, linked to imperfect targeting or crowding-out type externalities on households not covered by the safety net, via the breakdown of informal support networks (see Section 4). Optimal policy design would then require not just information on those currently most at risk, but also use insights on the informal links and insurance between the targeted group and other possibly vulnerable groups dependent on informal arrangements. In general, if policies cannot be assumed to be exogenous to household behaviour and networks, then more detailed analysis on the shocks experienced by households and the way households cope with income risk would be needed to inform policy. At present, very little analysis is available.

The emphasis on the ability to cope with risk via assets, human capital and informal insurance and on the opportunities available marks a convergence of different disciplines, bridging gaps with more qualitative approaches. The increasing emphasis on monitoring different forms of capital (human, physical and social) and the opportunities to use these capital goods when needed clearly draws inspiration from Sen's 'entitlements' approach to the analysis of famine. Although I emphasise that household surveys can derive much of the relevant information to monitor and understand vulnerability to risk, similar approaches can be found in social-sciences literature using qualitative approaches (Moser 1998 and the reference therein give examples). Similarly to the approach taken in this paper, households are considered managers of complex portfolios of assets and interventions should be aimed to promote better opportunities to use these assets. This approach relies on more qualitative data collection techniques, such participatory assessment.

Some may be tempted to suggest that quantitative surveys should *not* be used to study vulnerability and risk-coping strategies, and leave qualitative studies fill the gap (as appears to be case at present in welfare monitoring activities). I do not take this position. Integrating qualitative data collection into quantitative household surveys is bound to yield less contradictory evidence than presently seems to be found by the different approaches, for example, on the effects on vulnerability and poverty from

economic policies. National household surveys are likely to be required to obtain information on the scale of vulnerability and its regional spread and diversity, and to inform decisions about policies and priorities. The local nature of qualitative studies is bound to add more detailed understanding of vulnerability, but the results are difficult to aggregate and compare across areas.

6 Conclusions

Households in developing countries continue to face considerable risk, threatening their livelihood. In this paper, I have discussed the different strategies households use to cope with this risk. I have focused on income-based strategies, on assets as self-insurance and on informal insurance arrangements. Households are constrained in using these strategies. Income-based strategies are limited because of entry-constraints into profitable activities, leaving the poor to concentrate on low return, low risk activities. Self-insurance is limited by access to assets and poor functioning of asset markets when a crisis hits the household. Informal insurance arrangements are affected by sustainability constraints, often excluding the poor from these arrangements; furthermore, economy-wide shocks cannot be handled by these arrangements.

Economic policies could contribute to better protection against risk. Improved working of asset markets and macroeconomic stability would contribute to the usefulness of self-insurance. Increased access to alternative economic activities and increased opportunities could allow income-based strategies to be strengthened. Public safety nets could be a useful alternative, although initiatives to develop safety nets should take into account existing risk-coping strategies to understand their overall effects. Strengthening self-insurance may remain an insufficiently explored alternative, such as via group-based savings. More empirical research, however, is necessary to assess the functioning of informal risk-sharing arrangements and the consequences of interventions thereupon.

Obtaining estimates on the vulnerable population rather than the currently poor is very data intensive, most likely requiring panel data to ensure that they reflect genuine vulnerability. Cross-section surveys could also provide useful insights. In particular, they could provide information on the underlying determinants of the risk-reducing strategies, in the form of physical, human and social capital. They also could inform about the risk faced by households and the opportunities available to households, currently and during past crises. Qualitative studies could provide useful insights but incorporating some of these concerns in large quantitative household surveys is likely to yield important pay-offs in terms of better understanding of changes in welfare and vulnerability, and in terms of optimal policy design.

References

- Alderman, H. and C. Paxson (1994), 'Do the poor Insure? A Synthesis of the Literature on Risk and Consumption in Developing Countries', in International Economics Association, Moscow Meeting, Proceedings, Vol.4.
- Alderman, H. (1998), 'Saving and Economic Shocks in Rural Pakistan', *Journal of Development Economics*, Vol.51, No.2, 343–66.
- Albarran, P. and O. Attanasio (2001), 'Do Public Transfers Crowd out Private Transfers? Evidence from a Randomized Experiment in Mexico', WIDER Discussion Paper No.2002/6, UNU/WIDER, Helsinki, and in Dercon (2001a).
- Alwang, J., P. Siegel and S. Jorgensen (2001), 'Vulnerability: a View from Different Disciplines', Social Protection Unit, Human Development Network, World Bank, May 2001.
- Amin, S., A. Roi and G. Topa (1999), 'Does Microcredit Reach the Poor and Vulnerable? Evidence from Northern Bangladesh', CID Working Paper No.28, Harvard University.
- Attanasio, O. and J. Rios-Rull (2000), 'Consumption Smoothing and Extended Families', mimeo, University of Pennsylvania.
- Barrett, C.B., D. Clay and S. Holden (2001), 'Can Food-for-Work Programmes Reduce Vulnerability', WIDER Discussion Paper No.2002/24, UNU/WIDER, Helsinki, and in Dercon (2001a).
- Baulch, B. and J. Hoddinott (2000), 'Economic Mobility and Poverty Dynamics in Developing Countries', *Journal of Development Studies*, Vol.36, No.6.
- Bell, C. (1988), 'Credit Markets, Contracts and Interlinked Transactions', in Chenery, H. and T.N. Srinivasan (eds), *Handbook of Development Economics*, Vol.1, North-Holland, Amsterdam.
- Behrman, J. (1988), 'Intrahousehold Allocation of Nutrients in Rural India: Are Boys Favored? Do Parents Exhibit Inequality Aversion', *Oxford Economic Papers*, Vol.40, 32–54.
- Behrman, J. and Deolalikar, A. (1990), 'The Intrahousehold Demand for Nutrients in Rural South India: Individual Estimates, Fixed Effects and Permanent Income', *Journal of Human Resources*, 25, 665–96.
- Besley, T. (1994), 'Savings, Credit and Insurance', in J. Behrman and T.N. Srinivasan (eds), *Handbook of Development Economics*, Vol.IIIA, North-Holland, Amsterdam.
- Besley, T. (1995), 'Nonmarket Institutions for Credit and Risk Sharing in Low-Income Countries', *Journal of Economic Perspectives*, Vol.9 (Summer), 115–27.
- Bevan, D., P. Collier and J.W. Gunning (1991), *Peasants and Governments*, Oxford: Oxford University Press.
- Binswanger, H. and J. McIntire (1987), 'Behavioral and Maternal Determinants of Production Relations in Land-Abundant Tropical Agriculture', *Economic Development and Cultural Change*, Vol.36, 73–99.

- Bliss, C. and N. Stern (1982), *Palanpur: The Economy of an Indian Village*, Oxford University Press, Oxford.
- Chaudhuri, S. and C. Paxson (1994), 'Consumption Smoothing and Income Seasonality in Rural India', Discussion Paper #173, Princeton University Research Program in Development Studies.
- Chaudhuri, S., J. Jalan and A. Suryahadi (2001), 'Assessing Household Vulnerability to Poverty: A Methodology and Estimates for Indonesia', Draft, Columbia University, New York.
- Christiaensen, L. and R. Boisvert (2000), 'On Measuring Households Food Vulnerability: Case Evidence from Northern Mali', Working Paper, Department of Agricultural, Resource and Managerial Economics, WP 2000-05, March.
- Coate, S. and M. Ravallion (1993), 'Reciprocity without Commitment: Characterisation and Performance of Informal Insurance Arrangements', *Journal of Development Economics*, Vol.40, 1-24.
- Collier, P. and J.W. Gunning (1999), 'Explaining African Economic Performance', *Journal of Economic Literature*, March, Vol.37, No.1, 64-111.
- Conning, J. and M. Kevane (2001), 'Trustworthy Bridges: Intermediation in Finance and Safety Nets in Developing Countries', in Dercon (2001a).
- Conning, J. and M. Kevane (2002), 'Community Based Targeting Mechanisms for Social Safety Nets: A Critical Review', *World Development* (forthcoming).
- Corbett, J. (1988), 'Famine and Household Coping Strategies', *World Development*, Vol.16, No.9.
- Cox, D. and E. Jimenez (1992), 'Social Security and Private Transfers in Developing Countries: the Case of Peru', *The World Bank Economic Review*, Vol.6, No.1, 115-69.
- Czukas, K., Fafchamps, M. and C. Udry (1998), 'Drought and Saving in West-Africa: Are Livestock a Buffer Stock', *Journal of Development Economics*, Vol.55, No.2, 273-305.
- Davies, S. (1996), *Adaptable Livelihoods*, Macmillan Press, London.
- Deaton, A. (1991), 'Savings and Liquidity Constraints', *Econometrica*, Vol.59, No.5, 1,221-48.
- Deaton, A. (1992), 'Household Saving in LDCs: Credit Markets, Insurance and Welfare', *Scandinavian Journal of Economics*, Vol.94, No.2, 253-73.
- Deaton, A. (1997), *The Analysis of Household Surveys: A Microeconomic Approach*, Johns Hopkins University Press, Baltimore.
- Dercon, S. (1996), 'Risk, Crop Choice and Savings: Evidence from Tanzania', *Economic Development and Cultural Change*, Vol.44, No.3, 385-514.
- Dercon, S. (1998), 'Wealth, Risk and Activity Choice: Cattle in Western Tanzania', *Journal of Development Economics*, Vol.55, No.1, 1-42.
- Dercon, S. (2000), 'Income Risk, Coping Strategies and Safety Nets', Centre for the Study of African Economies Working Paper, WPS/2000.26, Oxford University.

- Dercon, S. (ed.) (2001a), *Insurance Against Poverty*, manuscript prepared for UNU/WIDER Studies in Development Economics, Oxford University Press, Oxford.
- Dercon, S. (2001b), 'Economic Reform, Growth and the Poor: Evidence from Panel Data in Rural Ethiopia', Centre for the Study of African Economies Working Paper, WPS/2001.8, Oxford University.
- Dercon, S. and P. Krishnan (1996), 'Income Portfolios in Rural Ethiopia and Tanzania: Choices and Constraints', *Journal of Development Studies*, Vol.32, No.6, 850–75.
- Dercon, S. and P. Krishnan (2000a), 'Vulnerability, Seasonality and Poverty in Ethiopia', *Journal of Development Studies*, Vol.36, No.6,
- Dercon, S. and P. Krishnan (2000b), 'In Sickness and in Health: Risk-Sharing within Households in Ethiopia', *Journal of Political Economy*, Vol.108, No.4 (August), 688–727
- Dercon, S. and P. Krishnan (2001), 'Does Food Aid Work?', Oxford University, mimeo.
- De Weerd, J. (2001), 'Risk Sharing and Endogenous Group Formation', in Dercon (2001a).
- De Waal, A. (1987), *Famines that Kill: Darfur Sudan, 1984–85*, Oxford: Clarendon Press.
- Eswaran, M. and A. Kotwal (1989), 'Credit as Insurance in Agrarian Economies', *Journal of Development Economics*, Vol.31, No.1, 37–53.
- Fafchamps, M. (1999), 'Rural Poverty, Risk and Development', FAO Economic and Social Development Paper, No.144.
- Fafchamps, M. (2002), 'Inequality and Risk', WIDER Discussion Paper No.2002/7, UNU/WIDER, Helsinki, and in Dercon (2001a).
- Foster, A.D. (1995), 'Prices, Credit Markets and Child Growth in Low-Income Rural Areas', *The Economic Journal*, Vol. 105 (May), 551–70.
- Frankenberg, E. (1999), 'The Real Costs of Indonesia's Economic Crisis', RAND, mimeo.
- Gaiha, R. and A. Deolalikar (1993), 'Persistent, Expected and Innate Poverty: Estimates for Semi-Arid Rural South India 1975–1984', *Cambridge Journal of Economics*, Vol.17, No.4, 409–21.
- Grimard, F. (1997), 'Household Consumption Smoothing through Ethnic Ties: Evidence from Côte d'Ivoire', *Journal of Development Economics*, Vol.53, 391–422.
- Gertler, P. and Gruber, J. (1997), 'Insuring Consumption Against Illness', National Bureau of Economic Research Working Paper Series, No.6035.
- Goldstein, M., A. de Janvry and E. Sadoulet (2001), 'You Can't Always Get What You Want: Inclusion and Exclusion in Mutual Insurance Networks in Southern Ghana', in Dercon (2001a).
- Hayashi, F., J. Altonji and L. Kotlikoff, (1996), 'Risk-Sharing between and within Families', *Econometrica*, Vol.64, No.2, 261–94.
- Hoff, K. (1996), 'Informal Insurance Schemes: An Equilibrium Analysis', mimeo.

- Jacoby, H. and E. Skoufias (1997), 'Risk, Financial Markets and Human Capital in a Developing Country', *Review of Economic Studies*, Vol.64, No.3, 311–36.
- Jalan, J. and M. Ravallion (1998), 'Behavioral Responses to Risk in Rural China', Policy Research Department, Working Paper 1978, World Bank.
- Jalan, J. and M. Ravallion (2000), 'Is Transient Poverty Different? Evidence from Rural China', *Journal of Development Studies*, Vol.36, No.6.
- Kamanou, G. and J. Morduch (2001), 'Measuring Vulnerability to Poverty', in Dercon (2001a).
- Kinsey, B., K. Burger and J.W. Gunning (1998), 'Coping with Drought in Zimbabwe: Survey Evidence on Responses of Rural Households to Risk', *World Development*, Vol.26, No.1, 89–110.
- Kochar, A. (1995), 'Explaining Household Vulnerability to Idiosyncratic Income Shocks', AEA Papers and Proceedings, *American Economic Review*, Vol.85, No.2, 159–64.
- Ligon, E., J. Thomas and T. Worrall (2001), 'Informal Insurance with Limited Commitment: Theory and Evidence from Village Economies', *Review of Economic Studies* (forthcoming).
- Ligon, E. (2002), 'Targeting and Informal Insurance', WIDER Discussion paper No.2002/8, UNU/WIDER, Helsinki, and in Dercon (2001a).
- Lim, Y. and R. Townsend (1994), 'Currency, Transaction Patterns, and Consumption Smoothing: Theory and Measurement in ICRISAT Villages', mimeo.
- Lund, S. and M. Fafchamps (2000), 'Risk-Sharing Networks in Rural Philippines', mimeo.
- Lustig, N. (ed.) (2001), 'Shielding the Poor. Social Protection in the Developing World', Brookings Institution Press, Washington DC.
- Morduch, J. (1990), 'Risk, Production and Saving: Theory and Evidence from Indian Households', Harvard University, Manuscript.
- Morduch, J. (1995), 'Income Smoothing and Consumption Smoothing', *Journal of Economic Perspectives*, Vol.9 (Summer), 103–14.
- Morduch, J. (1999), 'Between the State and the Market: Can Informal Insurance Patch the Safety Net?', *World Bank Research Observer*, Vol.14, No.2 (August), 187–207.
- Morduch, J. (2001), 'Consumption Smoothing Across Space: Tests for Village-Level Responses to Risk', in Dercon (2001a).
- Moser (1998), 'The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies', *World Development*, Vol.26, No.1, 1–19.
- Paxson, C. (1993), 'Consumption and Income Seasonality in Thailand', *Journal of Political Economy*, Vol.101, No.1, 39–72.
- Platteau, J-P (1997), 'Mutual Insurance as an Elusive Concept in Traditional Rural Communities', *Journal of Development Studies*, Vol.33, 6, 764–96.

- Pritchett, L., A. Suryahadi and S. Sumarto (2000), 'Quantifying Vulnerability to Poverty: A Proposed Measure, Applied to Indonesia', Policy Research Working Paper, #2437, World Bank: Washington DC.
- Rahmato (1991), *Famine and Survival Strategies, A Case Study from Northeast Ethiopia*, Nordiska Afrikainstitutet, Uppsala.
- Ravallion, M. (1988), 'Expected Poverty under Risk-Induced Welfare Variability', *Economic Journal*, Vol. 98 (March), 1,173–83.
- Reardon, T. (1997), 'Using Evidence of Household Income Diversification to Inform Study of the Rural Nonfarm Labor Market in Africa', *World Development*, Vol.25, No.5 (May).
- Reardon, T., A.A. Fall, V. Kelly, C. Delgado, P. Matlon, J. Hopkins and O. Badiane (1994), 'Is Income Diversification Agriculture-led in the West African Semi-Arid Tropics', in A. Atsain, S. Wangwe and A.G. Drabek (eds), *Economic Policy Experience in Africa: What Have We Learned*, IFPRI, Washington DC, 207–30.
- Reardon, T., C. Delgado and P. Matlon (1988), 'Coping with Household-Level Food Insecurity Drought-Affected Areas of Burkina Faso', *World Development*, Vol.16, No.9, 1,148–70.
- Rose, E. (1999), 'Consumption Smoothing and Excess Female Mortality in Rural India', *Review of Economics and Statistics*, Vol.81, No.1 (February), 41–9.
- Rosenzweig, M. (1988), 'Risk, Implicit Contracts and the Family in Rural Areas of Low Income Countries', *Economic Journal*, Vol. 98, No.1, 148–70.
- Rosenzweig, M. and K. Wolpin (1993), 'Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-income Countries: Investment in Bullocks in India', *Journal of Political Economy*, Vol.101, No.2, 223–44.
- Rosenzweig, M. and H. Binswanger (1993), 'Wealth, Weather Risk and the Composition and Profitability of Agricultural Investments', *Economic Journal*, Vol.103, No.56–78.
- Thomas, D., K. Beegle, E. Frankenberg, B. Sikoki, J. Strauss and G. Teruel (2001), 'Education in a Crisis', RAND and UCLA, mimeo.
- Townsend, R.M. (1994), 'Risk and Insurance in Village India', *Econometrica*, Vol.62, No.3, 539–91.
- Townsend, R.M. (1995), 'Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low-Income Economies', *Journal of Economic Perspectives*, Vol.9 (Summer), 83–102.
- Udry, C. (1991), 'Credit Markets in Northern Nigeria: Credit as Insurance in a Rural Economy', *World Bank Economic Review*, Vol.4, No.3, 251–71.
- Udry, C. (1994), 'Risk and Insurance in a Rural Credit Market: An empirical Investigation of Northern Nigeria' *Review of Economic Studies*, Vol.61, No.3, 495–526.
- World Bank (2000), *World Development Report 2000/01: Attacking Poverty*, Washington DC.