Assessing vulnerability

Stefan Dercon

Jesus College and
CSAE, Department of Economics,
Oxford University
stefan.dercon@economics.ox.ac.uk

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Executive summary

This paper has presented a framework to describe and analyse poverty, risk and vulnerability. It has discussed the possibilities to measure vulnerability to poverty, with an emphasis on quantitative techniques. Finally, it has discussed some of the recent challenges and issues related to a policy to reduce vulnerability.

Although some of the analytical methods described are in their infancy and the data requirement are high and currently not met, it is important to bring some of these issues higher on the policy agenda, including when assisting and contributing to the design of poverty reduction strategies, such as in the context of PRSPs and other key policy declarations. One important reason is that vulnerability and risk is increasingly shown not to be just another dimension of poverty; it is also a cause of poverty and destitution.

I have argued that expanding quantitative data collection and research is going to be especially helpful, if only to provide a clearer focus in policy discussions. Little is currently known about the size, frequency and relative importance of different risks faced by households and individuals across the developing world. More should be known about the ability of individuals, households and communities to cope with events and shocks, as well as with fluctuations such as seasonality. Bringing this into the discussion, e.g. in the form of vulnerability profiles similar to the standard quantitative poverty profiles, could be very helpful.

Vulnerability must be defined relative to some benchmark. The natural benchmark would be vulnerability to poverty. Poverty should be considered in its various dimensions. Vulnerability to one dimension does not necessarily mean vulnerability to another. The lack of a 'single' dimension for discussion should not be a problem, even in quantitative work. It is perfectly feasible to discuss in quantitative work vulnerability to poor education, to poor health and to income poverty as separate dimensions of vulnerability to poverty. Vulnerability is also forward-looking: it makes a statement about future poverty.

Vulnerability is then defined as ex-ante poverty, i.e. before one knows what the outcome of risk variables will be. A measure could try to count those that have a high probability of being poor in the next period or further in the future. It could also weights of the extent of deprivation that is possible e.g. how deep below the poverty line one may fall. Using this definition, it is clear that not only poverty due to risk should be considered: measures of vulnerability should also include those not expected to move out of poverty, those that will move permanently into poverty and those falling into poverty due to predictable fluctuations, such seasonality. Nevertheless, it would be useful to be able to distinguish these different groups in analysis. Vulnerability analysis could include decomposition into who is most at risk and from which sources of risk. Furthermore, disentangling poverty and its determinants into permanent factors, shocks and fluctuations would be illuminating too.

In section 4 some ways of measuring vulnerability were proposed. Currently, much work is going on to construct outcome-based measures. These are measuring vulnerability to income poverty, low education, malnutrition, etc. The underlying ideas and data needs were described. Some improvements were suggested, such as using direct measurement of shocks and modelling taking into account the responses to shocks. There should not be a unique focus on outcomes only: assets and activities form important determinants of vulnerability. The problem of measuring these determinants of the vulnerability process is that their current values or levels are not what matters, but the ability to mobilise them when needed. More work is needed to explore these dimensions, as well as on measures informing on coping strategies used.

Data needs are high, but one should begin to tackle these gaps. It is a priority to improve our understanding of the type, magnitude and frequency of shocks faced by households in developing countries. Non-contextual survey techniques should collect quantitative data on risks and the relations between risk (including covariances). More information on the extent to which assets, including human capital and social capital can be relied on to cope with hardship would also be needed. Work on informal mutual support mechanisms, their functioning and changes over time would also be important. Contextual, qualitative approaches could play an important role in this process, but more systematic ways of integrating this information into quantitative work would be required, involving more attention to sampling frames and ex-post quantification of this work.

The ability of households and individuals to cope with hardship is also changing rather rapidly and should remain a focus of future work across the developing world. Traditional insurance mechanisms are under pressure from factors such as population growth, wealth differentiation, changing age structures of the population and the impact of AIDS. It is also important to study further the impact of processes of globalisation and domestic market liberalisation. Markets effectively spread risk over large distances and people. Trading risk is beneficial to individuals. But it also implies that many 'natural' shocks become less important and are replaced by 'man-made' shocks, affecting different people and in a different way. Also, market and institutional imperfections may contribute to shocks being exacerbated within the system. Economic reform processes also involve shocks that some may find very hard to deal with. It should never be underestimated that vulnerability is likely to have increased considerably in the period predating reform, since the single most important reason for changing policy is deep economic or political crisis. This increased vulnerability will limit the ability of households to respond to new incentives.

The paper also focused on sources of risk and vulnerability that are largely ignored thusfar. Public service provision, typically rationed in many developing countries (such as clinics running out of drugs or absent teachers) imply serious risks faced by households to transform income and assets into outcomes, such as health and education. Indeed, this is an example why it would be fruitful to distinguish different poverty dimensions in analysing vulnerability to poverty: even if these risks do not affect

vulnerability to income poverty in the short run, they imply serious risks to health and education.

I have also suggested situations were safety nets – or in general social protection policies - could be sources of vulnerability. Since risk and uncertainty are crucial for households perception of vulnerability and their responses to it, more so than in any other field, the issues of commitment, credibility and predictability of both government and donor policy are pre-requisites for vulnerability reductions from policy.

For policy makers, concerned with issues of vulnerability, this seems a large agenda. Many of these issues require much more research and a close interaction between academics and policy-makers both in developing countries as in donor countries. On the ground, for example in the current PRSP discussions, it is nevertheless possible to include some of these themes. For example, much debate on growth and poverty, and on the design of pro-poor growth policies focuses on raising mean incomes of the poor. For example, packages including credit or modern inputs may be provided to rural farmers. Ex-ante, the expected impact is typically discussed in terms of a 'normal' year or 'normal' international circumstances. In a world with high variability and risk, a more fruitful approach would be to also focus on when things go wrong, for example if a drought hits or international commodity prices collapse (however temporary the shock is). Focusing on such 'worst case scenarios' would check how robust the policy package and its likely welfare impact would be in bad circumstances. Questions to ask would include what the impact on different groups would be in this scenario? Can one credibly guarantee to keep public service delivery going at current terms? Will the safety net be sustainable in this context and provide sufficient protection?

Finally, it is worth stressing that the World Bank, via its Social Protection Unit, has taken quite a few of the issues raised in this paper forward in recent years. Nevertheless, it is worth listing some of the elements raised in this paper, that are generally missing or given less prominence. First, much of the quantitative work encouraged or supported has thusfar focused on income poverty. The discussion in this paper has shown that there is no need to do so. Next, the focus in their work appears to have been on head count measures of poverty, ignoring e.g. information about the depth of poverty or the inequality among the poor. Again, there is no need to so. Also, by focusing exclusively on risk, it ignores that fluctuations could also be very harmful to households, since given credit, asset and good market imperfections responding to predictable fluctuations such as seasonality is also difficult. Including this dimension seems important, if only since other standard work focusing on chronic or permanent poverty also does not include it. In the World Bank work, one also appears to ignore (relatively speaking) certain risks, including the risks of exclusion from informal support system, the risks related to public service provision and risks related to access to assets. Finally, their work has largely ignored risks related to policy credibility, long term commitments, including from donors and the risks of exclusion from vulnerability reduction policies, especially from safety nets.

Structure and Summary of the main arguments

1 Introduction

Risk and vulnerability to poverty has received renewed attention in recent years. The paper presents a framework for discussing risk and vulnerability, its measurement and its links with poverty. I will focus on the scope for quantitative approaches, complementary to more qualitative and contextual approaches. I will also review some of the key challenges related to changes in vulnerability over time.

Vulnerability to poverty is an important dimension of poverty and deprivation, but it is also a cause of deprivation There is evidence on the permanent effects of shocks on human capital formation, nutrition and incomes. Risk-reducing actions to avoid risk are also causing permanently higher poverty. There is evidence on the permanent effects of shocks on human capital formation, nutrition and incomes. Risk-reducing actions to avoid risk are also causing permanently higher poverty. The presence of poverty traps and other forms of persistence means that reducing vulnerability will have an important impact on poverty reduction.

2 Some preliminary comments on method and scope

Although there is a rich and valuable experience with discussing vulnerability using contextual or qualitative approaches, introducing risk and vulnerability in policy discussions via quantitative means may help to put it higher on the policy agenda. The paper presents ways of measuring and analysing risk and vulnerability using non-contextual and quantitative approaches, some building on contextual and qualitative approaches. If the aim is to inform and influence policy beyond specific contexts, quantitative approaches cannot be ignored. In general, databased policy making in developing countries would be a big step forward.

3 What is vulnerability? A framework for analysis

Defining poverty, risk and vulnerability

Poverty is acknowledged to be multidimensional. There is no reason to limit a concept and measurement of vulnerability to income, consumption or other money-metric dimensions only, even when using quantitative means. Vulnerability related to dimensions such as educational opportunities, mortality, nutrition and health could be measured as well.

Risk relates to events possibly occurring, beyond the direct control of individuals and households. The focus in work on vulnerability should be on downside risk.

For operational use and measurement, vulnerability should always be defined relative to some benchmark. In poverty policy contexts, vulnerability to poverty, in its various dimensions, is the appropriate concept. Vulnerability is the product of risk, but also of household conditions and actions.

A framework for analysing risk and poverty

I borrow from economics to describe a framework for analysing first poverty and then the links with risk and vulnerability. The framework focuses of households; they consist of individuals and are part of groups and communities. Households and communities are units of conflict and co-operation. Households and individuals have assets, such as labour, human capital, physical capital, social capital, commons and public goods at their disposal to make a living. Assets are used to generate income in various forms, including earnings and returns to assets, sale of assets, transfers and remittances. Households actively build up assets, not just physical capital but also social or human capital, as an alternative to spending.

Incomes provide access to dimensions of well-being: consumption, nutrition, health, etc., mediated by information, markets, public services and non-market institutions. Generating incomes from assets is also constrained by information, the functioning of markets and access to them, the functioning of non-market institutions, public service provision and public policy.

Poor households are seen in this framework as weighing current survival and well-being, with decisions affecting their future possibilities. They are severely constrained in their options by their assets and the conditions they face.

The role and nature of risk

Risks are faced at various steps in this framework. They do not just relate to environmental or epidemiological factors. Risks involve also markets, public policy and social capital. Assets, their transformation into incomes and in turn their transformation into dimensions of well-being are all subject to risk.

Assets are subject to risk themselves. Examples include destruction due to environmental factors or conflict, the erosion of human capital due to health or unemployment, the collapse of asset markets and values, problems with property rights and their enforcement, risks in social capital and access risk to public goods and commons.

The transformation of assets into income is also subject to risk. Beyond obvious but important factors such as climate or health, one should focus on (inter alia) price risk, the covariances between different income risks, risks to access of rationed inputs, risks of exclusion from informal or formal safety nets, problems related to contract enforcement and risks to changes in policy. Entitlements from incomes are also mediated by risk, including price risk but also and importantly, risks related to imperfect information and to the provision of public goods and services, especially since they often are rationed.
Risks related to policy, public services, access to commons and public goods, risks to access and the functioning of social capital and risks of exclusion from formal and informal safety nets are largely ignored in standard approaches, such as in WDR 2000/01.
Different risks are quite different in size, likelihood and frequency over time. Different characteristics of risk have different implications for the ability to cope with them, as well as for policy. Characteristics include the extent of state dependence or correlation over time, whether the shocks are rare but very large, whether the shocks are occurring at the same time across individuals, rather than individual-specific.
Most households and individuals are aware of the existence of these different sources of risk and households actively try to cope with this risk in a variety way, using well-documented strategies.

Defining vulnerability and its causes in this framework
Well-being and poverty are the ex-post outcome of a complicated decision process of individuals and households over assets and incomes, faced with risk. Vulnerability to poverty is the ex-ante situation, i.e. before one has knowledge of the actual shocks that will occur. Vulnerability is determined by the options available to households and individuals to make a living, the risks they face and their ability to handle this risk.
Measures of vulnerability to poverty in its various dimensions could be derived. There is no reason to limit it to income poverty. Vulnerability to poverty measures will have to take into account how likely 'bad' situations will occur, including those outcomes that can be well predicted.
The vulnerable consist of four groups: the permanently poor, those becoming permanently poor in the future due to some trend evolution, those that are likely to become poor due to predictable events (such as seasonality) and those likely to become poor due to risk and shocks. While the focus in much current work may be on the last group, the other groups, including those facing seasonality, should not be excluded.

4 A measure of vulnerability?

Outcome-based measures: characteristics
An outcome-based measure of vulnerability needs to be forward-looking and measure a situation before all uncertainty has been removed, i.e. 'ex-ante'. This implies that the key problem is to derive credible measurement of all possible outcomes, including their likelihood. The complications arise from the fact that different situations 'ex-post', i.e. the so-called 'states of the world', all imply quite different levels and distributions of these outcomes. Measurement of outcomes implies that one needs to take into account not just the risks faced but also the options and ability to handle these risks.
The aim is to construct a distribution of outcomes in each possible situation. Given this information, different quantitative measures of vulnerability are possible. For example, one can measure the number of people or the groups that have a probability above 50 percent (or other threshold) to be below the minimum level of well-being for the particular measure used. Above this threshold, individuals or groups could be called highly vulnerable. High vulnerable groups can be distinguished from low vulnerability groups by using different probabilities as cut-off points.
Vulnerability ex-ante and poverty ex-post will be related but not necessarily involve the same people. There is a priori no reason that those ex-ante identified as highly vulnerable will all be poor ex-post, while low vulnerability may still imply ex-post poverty.
Vulnerability indicators, based on head counts of those with high ex-ante probabilities of poverty, are increasingly found in policy research. For example, work in Indonesia found 22 currently poor but ex-ante vulnerability was 45 percent. Vulnerability profiles can also be constructed, comparing vulnerability of different regions or social groups.

Outcome-based measures: techniques and problems
These measures are not without problems. The information requirements are high and no straightforward measurement of hypothetical situations is possible via survey data. Currently, most of the applications used, infer the distributions of possible outcome shocks from the error process in cross-section regression models explaining consumption outcomes by household and community variables. This implies strong assumptions

about how shocks evolve over time and space. Large common shocks, such as an economic crisis, cannot be captured in the measures of vulnerability used thusfar, although they surely form part of the motivation of this work.

One possible improvement is to estimate the shock distributions based on data for changes in outcomes, using panel data. The data on outcome changes implicitly include the response to actual shocks faced by individuals. This approach makes sure that shock distributions do not have to come purely from extrapolating cross-sectional error processes. Other work has shown that one can relax the assumptions regarding the distribution of outcome shocks faced by individuals by using non-parametric models.

The current focus has been on a vulnerability head count, i.e. counting individuals that have a probability at least equal to some level to fall into poverty in one or another dimension. Furthermore, the focus has largely been on consumption poverty. However, there is no need to restrict measurement to these dimensions, while measures of vulnerability based on poverty depth or severity of poverty are also possible. The methodological ideas remain the same.

One can also go a step further, if information on the types of risk faced is available. The dubious assumptions about statistical error processes can be replaced by explicitly modelling shocks and the ability to cope in a prediction model. By using survey data on shocks faced, combined with historical sources on large or common shocks such rainfall, price shocks etc., it would be possible to derive measures of vulnerability allowing for more realistic risk models and differential risk-coping ability on the part of households.

Panel data would be most helpful to model the impact of shocks on outcomes and therefore to construct prediction models. Cross-section approaches should however not be excluded: shocks and risk can also be fruitfully included to yield superior models to predict vulnerability than those used thusfar.

Measuring vulnerability using assets, incomes and risk strategies

The data needed to construct outcome-based measures are very high, while they do not give much insight about how the poor cope with vulnerability. Other measures may help to fill in these gaps. Sustainable livelihoods approaches have focused on assets. Quantitative work has also found that access to assets is an important determinant of poverty but also of the ability to cope with hardship. It may be worthwhile to use quantitative measures of different assets (including physical capital, human capital, commons, public goods and social capital) to proxy vulnerability.

For physical and financial assets to be useful for protecting against vulnerability, they should have a reasonable return and limited risk. They also should be liquid and maintain their values during crises. These latter characteristics are not easily quantified but crucial for vulnerability. As a consequence, measures of asset values as proxies for vulnerability may have problems, unless these dimensions can be addressed.

Also for other assets, including commons, public goods and human capital, the key point is whether they can withstand stress, so that they can be effectively mobilised during crises. There is some evidence related to human capital and the commons, but more work is needed. Mutual support systems are definitely important, but access to these social networks during stress and crises is also no guarantee, even despite well identified ethnic or family links. The collapse of some of these systems during famines is well documented, but even for idiosyncratic shocks, evidence suggests that support is no certainty.

Assets in general are therefore likely to assist the ability to cope. Measurement of different types of assets should be encouraged. But much attention will have to be paid on whether they can actually be mobilised when idiosyncratic or common shocks occur – otherwise their role as a determinant and proxy for vulnerability would be misjudged.

Social safety nets themselves should also be the object of study and should be included in any attempt to measure vulnerability and its determinants. Their presence and the targeting of actual support to the poor are usually seen as sufficient indicators of their effectiveness. From the point of vulnerability, this is insufficient: it needs to be known whether they effectively reduce the impact of shocks on individuals, while the risks of exclusion should be assessed as well.

Income or crop diversification is often considered as a sign of reduced vulnerability. While they can contribute to reducing income risk, in practice, they tend to be poor proxies, since the motivation and costs to enter into different activities varies substantially. Activity based measures using information on specific risk-related activities may be more fruitful.

Some other 'vulnerability' measures, used in early warning systems via vulnerability maps, may be useful, but they typically are vague about the meaning of vulnerability and risk, while assets, ability to cope and outcomes are not easily distinguished. Specific microstudies in the food security literature have used forward-looking vulnerability measures as considered in this paper and linked them with alternative simple measures, such as

related to eating less during crises and typical dietary diversity. These are definitely dimensions to explore further.

Data requirements for quantitative studies

A lot of information is needed to establish patterns of vulnerability across space and time, and much of this information is missing in current standard survey instruments. Participatory poverty research and livelihoods analysis tends to cover many of these issues, even though the rich, contextual detail comes at a cost of doubts (rightly or wrongly) about generality and representativeness. Efforts to integrate this continuing research effort into quantitative work and sampling frames could have high returns in terms of impact and should be encouraged.

Measuring shocks within household surveys can be done using relatively simple but carefully piloted modules. Examples include detailed information about shocks in current periods or large, catastrophic shocks over longer periods and covariate risk processes. More direct data collection on individual, household and community mechanisms to cope with shocks, including on their reliability in different types of crises is also needed. Another focus should be work on vulnerability to seasonality and the mechanisms to cope with this problem – another dimension largely ignored by standard cross-section surveys. Further work on informal and formal mechanisms for coping with risk is essential, inter alia with a focus on the enforcement of rights to support, the risk of exclusion and their changes over time.

Panel data are not essential to gain useful quantitative insights on these issues, but are crucial for increasing our quantitative understanding of shocks and their impact.

Further work on informal and formal mechanisms for coping with risk is essential, inter alia with a focus on the enforcement of rights to support, the risk of exclusion and their changes over time. Work on the uncertainties surrounding public service provision is also important.

5 Changes in vulnerability: policy and challenges

Policies for reducing vulnerability and the risks of policy change: a comment

Policies to reduce vulnerability will include standard poverty reduction policies, aimed at improving levels and trends in well-being, but will need to be supplemented with policies focusing on risk and on fluctuations in well-being, such as related to seasonality. These additional policies should address or compensate for imperfections in insurance and in consumer credit markets.

The World Development Report 2000/01 acknowledges that vulnerability reducing policies should be more than safety net policies, but convincingly argue to start from the observed strategies used by individuals, households and communities. Optimal policy design should aim to strengthen, complement and replace existing strategies to obtain maximal reduction in vulnerability. Replacement of traditional mechanisms is not necessarily problematic, although more needs to be known about the extent to which, how these changes are occurring and their net impact.

Markets and vulnerability

Markets are means of linking people both spatially and over time. Shocks that otherwise would have afflicted only 'island' economies are now transmitted across a larger group of people. Markets replace some 'natural' shocks by seemingly 'man-made' shocks. Trading risk in this way is profitable to all. Vulnerability should not increase, but shocks will now impact in different ways and on different people.

Large economic shocks and vulnerability

The transmission process in integrated economies would mean that large economic shocks are passed on relatively fast, via relative price changes. The financial crisis in the late 1990s in East Asia and other parts of the developing world may suggest that vulnerability to such shocks had increased due to fast liberalisation, in the context of (too) weak financial institutions.

Ex-post, it can be stated that despite high growth and poverty reduction in East Asian countries such as Indonesia, vulnerability to poverty following large shocks had remained relatively high. The main effects appear to have been the long term reduction in health and education investments by parents in their children, in order to cope in the short run.

Economic reform as a cause of vulnerability?

It tends to be ignored that economic reform often starts in the midst of deep economic crisis, when households and individuals have stretched resources in order to cope with this crisis. Economic reform is experienced by the

vulnerable as a large unexpected shock or a predictable one they cannot easily respond to. This should be considered in policy design. Some relatively standard economic reform measures for pro-poor growth may be contributing to substantial vulnerability reduction as well. But some may be conflicting. Examples are weighing the protection of past health and education investments of some with expanding health and education to those previously excluded; or limiting seasonal price fluctuations by public intervention versus affecting agricultural markets and pro-poor growth in the long run.

Public safety nets, informal insurance and changes in vulnerability

Traditional coping mechanisms, such as via mutual insurance, is likely to come further under pressure with economic mobility, wealth differentiation, changing age profiles and the AIDS crisis in the developing world. The security of access to land and commons is also coming under further pressure.

Another source of increased vulnerability could be safety net policies themselves, however well-intentioned. For example, with imperfect coverage by or limited scope of the safety net, support to some individuals may result in negative externalities on others, via the breakdown of reciprocal arrangements. Rationing of transfers in safety nets or unpredictable coverage and scope, as in food aid programmes, implies that very little security is offered. In fact, it is possible that it even results in some households being more vulnerable than without due to the uncertainties of the formal safety net.

Any policy to reduce vulnerability requires clear commitment and credibility. In the first place, it must be predictable.

6 Conclusions: the way forward

The discussion contains a number of recommendations for future work. There are many data needs, and also the need to incorporate these concerns in policy work. In practice, asking the right questions is already a big step forward. For example, in PRSP and other discussions focusing on pro-poor growth strategies, not just considering mean outcomes in normal circumstances, but at least considering scenarios when serious shocks affect the country, such as drought or economic shocks, is a starting point. Relevant questions include whether the mechanisms are in place to keep programmes on track as well as to mitigate the impact on the vulnerable. Questions also include whether vulnerability reducing policies, including safety nets, can be sustained in such difficult circumstances.

The World Bank and other agencies are pushing the conceptual and policy agenda forward on many of these issues. However, the paper has listed a number of areas where the current approaches appear to be leaving gaps. They require special attention, and include: expanding the focus to different quantitative dimensions of poverty, beyond just income poverty and a vulnerability head count; including issues of seasonality in their concerns; including other risks more explicitly, such the risks of exclusion from informal support system, the risks related to public service provision and risks related to access to assets, as well risks related to the vulnerability reduction policies themselves: risks related to policy credibility, long term commitments, including from donors and the risks of exclusion from vulnerability reduction policies, especially from safety nets.

1. Introduction

- *Risk and vulnerability to poverty has received renewed attention in recent years*

Many development practitioners and researchers have long recognised that individuals, households and communities face a large number of risks, related to for example climate, health or conflict. Specific policies, such as preventive health care or famine early warning systems form a well-established part of the aid and policy efforts in developing countries. However, only in recent years has the issue of risk and the impact this has on poverty (re-) gained prominence. The need to include some form of social security policy as an integral part of anti-poverty policy has become more broadly accepted. The pressure on and commitment by most bilateral and multilateral activities to mainstream poverty concerns in their policy formulation, lending and aid policies has contributed to putting risk higher on the agenda. Furthermore, the dramatic consequences of the East-Asia crisis has increased the concern of macroeconomists that issues of risk and shocks may well have been underrated. A further impetus has been given by making issues of 'security' a central part of the framework underlying the World Development Report 2000/01. These and other factors have given rise to renewed efforts to develop concepts and instruments to analyse and guide policy related to risk and vulnerability[1].

- *The paper discusses risk and vulnerability, its measurement and its links with poverty.*

In this paper, I focus on a number of related issues. First, I will discuss a framework to describe and analyse the links between risk, poverty and vulnerability. I will be concerned with how risk may imply vulnerability to poverty in its different dimensions. The purpose is not to present an exhaustive analysis or a complete literature survey; rather, I will present elements of a framework. Then I will discuss ways and the problems of *measuring* risk and vulnerability[2]. I will review different approaches and the insights they can offer as well the data needs and studies required for this purpose. Finally, I will briefly look at some recent challenges related to changing vulnerability, such as globalisation, the recent financial crisis in East Asia and beyond, economic reform programmes, pressures on traditional support systems, and some of the challenges faced when designing policies to have an impact on vulnerability to poverty.

- *I will focus on the scope for quantitative approaches, complementary to more qualitative and contextual approaches.*

In the next section, I will first present some comments on the approach taken. Essentially, risk and vulnerability will be mainly analysed from an economic perspective and much attention is paid in this paper on quantitative approaches to measuring risk and vulnerability. In this it differs from the 'sustainable livelihoods approach' often championed for its focus on risk and insecurity. Nevertheless, the questions asked are similar to those suggested by the

[1]Increasingly, these policies are referred to as 'social protection policy', in an attempt to broaden their scope from 'social security' issues, considered a concept too closely linked to rich developed countries and from 'safety net policies' linked to developing countries but considered too limited in scope.

[2]To avoid confusion, in section 2 and 3, the notions of 'risk', 'poverty', 'vulnerability', 'security' and 'measurement' used in this paper, will be defined and clarified.

livelihoods approach to analysing risk and vulnerability would ask for. But the underlying research methods, research tools and answers provided will be more closely linked to the type of economic analysis underlying much of the poverty and growth considerations in standard development policy documents. In this way, the analysis is complementary to the issues highlighted by the livelihoods approach while providing a potential inroads to put vulnerability and security issues higher on the policy agenda.

- *Vulnerability to poverty is an important dimension of poverty and deprivation…*

Before continuing, and to motivate further the focus of this paper, I would like to draw attention to two ways in which a focus on security (defined as the freedom from vulnerability to poverty) is warranted. The freedom of vulnerability to poverty is both an *end* and a *means* of development. To link it with Sen's analysis, the *freedom* from vulnerability to poverty is definitely an imprint dimension of well-being (Sen (2000)). As such, it makes it a valid focus for policy action. In many ways, the standard concerns by academics and policy-makers for vulnerability seem to stem from this perspective. Economic 'shock therapy' via structural adjustment programmes requires then an add-on in the form of a 'human face': safety nets and specific measures to protect those not able to cope themselves. Note that this view is common among proponents and opponents of such programmes.

- *… it is also a cause of deprivation.*

However, it should also be recognised as a *means* of development[3]. Indeed, the evidence has been mounting that vulnerability to poverty is *causing* poverty and ill-being. This has long been recognised in the fertility literature, where it is common knowledge that high infant mortality (i.e. the risk that children will not survive) increases the fertility rate, putting pressure on women's health as well as causing e.g. some of the well-documented externalities on environment, land pressure and well-being of others (Dasgupta (1993)). Nutrition studies have similarly long identified the persistence of short-term nutrition shortfalls via stunted growth. Since household and community 'shocks' are an important cause for these short-term shortfalls, this points to long-term consequences for well-being of temporary events[4].

- *There is evidence on the permanent effects of shocks on human capital formation, nutrition and incomes. Risk-reducing actions to avoid risk are also causing permanently higher poverty.*

There is a lot of evidence from socio-economic surveys that risk and shocks cause *permanently* lower human capital formation and lower incomes. For example, studies in India have found that negative income shocks caused households to withdraw children from schools. Even if children may later on return, this causes lower educational levels, affecting the children's ability to build up a better life for themselves (Jacoby and Skoufias (1995)). A similar action by parents has been reported to have occurred in Indonesia during the recent

[3] Dercon (2001a) discusses the *econometric* evidence supporting this view.

[4] This is not exactly borne out by most studies: some studies linking shocks such as drought to nutrition have suggested that 'catch-up' remains possible: i.e. that *over time* children may recover the lost nutrition and return to their personal growth curve (e.g. Hoddinott et al. (2000)). This would still imply that there are substantial transitory costs to the child's health.

crisis. In agricultural economics, the presence of high risk and limited ability to cope with it has been found to influence the choice of crops and technology. Evidence from surveys, tracking information on farm decisions over time from India, Tanzania and other countries have confirmed that more vulnerable asset-poor households choose low risk activities with low returns (such as sorghum, cassava or sweet potatoes in the study areas concerned). The result is lower mean incomes, and therefore persistence in income poverty (Morduch (1995), Dercon (1999)). Broadly speaking, these are examples of *poverty traps*: persistence in poverty is caused by the presence of risk and its consequences.

- *The presence of poverty traps and other forms of persistence mean that reducing vulnerability will have an important impact on poverty reduction.*

The presence of risk induced poverty traps has a number of consequences for poverty reduction efforts. Let me discuss them focusing on income poverty. First, it directly raises poverty: those experiencing shocks with which they cannot cope may be trapped in permanently lower income. Secondly, since overall mean income levels will be lower, there will be lower poverty reduction via multiplier or trickle down effects. Thirdly, it will also reduce the poverty elasticity of growth, i.e. the extent to which a given level of growth translates into poverty reduction. Some people will not be able to take advantage of opportunities in the economy due to their vulnerability to poverty.

2. Some preliminary comments on method and scope

- *Although there is a rich and valuable experience with discussing vulnerability using contextual or qualitative approaches, introducing risk and vulnerability in policy discussions via quantitative means may help to put it higher on the policy agenda.*

In writing this paper, I make some clear methodological choices. First, I will ***not*** use what has become known as the 'livelihoods approach', even though many elements of the analysis presented could well fit into it[5]. In particular, the issues addressed will be rather similar to those discussed in livelihood analysis, but the approach used to analyse them is different. A second (and linked) choice is an emphasis on survey-based, quantitative approaches to measuring risk and vulnerability, instead of contextual, or at least non-numerical approaches, as more commonly applied in the livelihoods approach.

[5] "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for means of living. A livelihood is sustainable *when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future*, while not undermining the natural resource base." (DFID Sustainable Livelihoods Guidance Sheet 1, emphasis added). It is correct that, contrary to a lot of standard quantitative poverty work, the 'sustainable livelihoods approach' and one of its key applications in policy documents, via Participatory Poverty Assessments, have consistently highlighted the issue of risk and vulnerability. The livelihoods approach has been very successful in highlighting and mainstreaming the diversity and multidimensionality (including non-monetary dimensions) of poverty. Although this may be more controversial, the 'livelihoods approach' has not *been as successful* in highlighting the issues of vulnerability and risk in standard Poverty Assessments (PAs), Country Strategy Papers (CSPs) or Poverty Reduction Strategy Papers (PRSPs), (although I am sure there are important exceptions). This is despite the fact that the approach has been the basis for much of the participatory work involved and also since risk and vulnerability is central in this approach. In any case, approaching the issue from another framework may complement the efforts to mainstream risk and vulnerability.

There are a number of reasons for these choices. The first is just that my own comparative advantage in analysing risk and vulnerability is not in discussing or applying that particular approach, and in focusing on survey-based evidence. The second is more *strategic*: much of the analysis and policy advice, not least from the large multilateral donors, is based on economists' approaches to poverty and growth, who have a tendency to require numerical evidence to back up arguments. In this paper, I will show that it is possible to introduce issues of vulnerability and risk as a central part of the analysis of poverty and deprivation, while remaining consistent with economic frameworks and tools[6]. Conceptually, this implies a focus on incentives, opportunities and market failures; the role of market versus non-market institutions; on risk management and coping strategies; quantifying risk, vulnerability and its consequences, and the public and private roles in protection. Nevertheless, at the end of the paper, some of the limitations of this approach and the complementarities with alternative strategies, including from livelihoods analysis, to investigate these issues will be clear.

The paper will also critically review some of the attempts to quantify the importance of risk and vulnerability across the population and specific groups. Recently, much work has been conducted by the Social Protection Unit at the World Bank to develop concepts, frameworks for policy and analysis, as well as quantitative measures of vulnerability (see e.g. Holzmann (2001), Alwang et al. (2001)). Rather than giving a balanced overall review of this work, I will mainly note problems in this work and try suggest improvements.

- *The paper will present ways of measuring and analysing risk and vulnerability using non-contextual and quantitative approaches, some building on contextual and qualitative approaches. If the aim is to inform and influence policy beyond specific contexts, quantitative approaches cannot be ignored. In general, much more data-based policy making in developing countries would be a big step forward.*

In this paper, I will also be concerned with 'measurement'. Measurement usually has the connotation of being strictly related to quantitative data, but this is not my intention here. Data on risk, vulnerability, the ability to cope, the networks one can fall back on, and other dimensions of security and insecurity will definitely include 'qualitative' dimensions. It is clear that these 'qualitative' data will be highly valuable in understanding and mainstreaming risk and vulnerability. Nevertheless, my focus will be on the *numerical or statistical aggregation* of quantitative and qualitative data, i.e. patterns and trends will be identified from these different types of data[7].

As has been clearly argued by Booth et al. (1998), the terms 'qualitative' and 'quantitative' are best reserved to types of data, and not data collection methods (such as 'participatory' versus 'survey based' methods). They distinguish 'contextual' from 'non-contextual'

[6] In the last two years, a large applied research effort has taken place via the World Bank, stimulated by the Social Protection Unit, to measure risk and vulnerability and to develop conceptual frameworks building on research work in economics and other disciplines. The similarity of some of the conclusions in this paper with their work stems mainly from the fact that I build on a similar literature rather than a strict view that their entire conceptualisation and other choices are correct and appropriate. In fact,

[7] Kanbur (2001), in the introduction to a fascinating collection of contributions on the relative advantages of different methodological approaches to poverty, suggests that this distinction in 'numerical' versus 'non-numerical' measurement may be more accurate.

methods, meaning that the former 'attempts to capture a social phenomenon within its social, economic and cultural context'. The 'livelihoods approach' typically suggests that the contextual methods are superior in understanding risk and vulnerability. In practice, little effort has been expended in trying to collect or use data from non-contextual methods on risk and vulnerability.

Table 1 Gains from quantitative approaches

-Time series comparisons to identify trends in whatever dimensions are measured,
-Cross-section comparisons between different individuals, households, groups and communities, and across regions, countries and continents
-Correlations to identify associations which raise questions of causality and covariant changes
-Estimates of prevalence and distributions within populations and areas
-Triangulation and linkages with qualitative data
-The credibility of numbers in influencing policy-makers
-The utility to policy-makers of being able to put numbers on trends and other comparisons

Source: Chambers (2001), p.22

In this paper, I take that the view that it is crucial to *also* collect data on risk, vulnerability and its determinants using *non-contextual* methods, i.e. surveys, using sampling frames, in order to establish statistically reliable patterns by geographic entities, ethnic or social groups, gender, age, wealth, season or other dimensions and groups. I can only agree with Chambers (2001) who lists the potential benefits from collecting data using non-contextual methods (which he calls quantitative, see table 1). The power to express distributions by groups, and the simplification offered to policy-makers suggests that survey-based measurement should not be ignored. In general, data-based policy making provides opportunities for reducing arbitrariness in policy measures – in the field of poverty and vulnerability this would mean an important improvement.

Finally, I am fully aware that some of this comes at a cost in terms of the participatory nature of the information gathering and analysis, which goes against the spirit of PRSP and similar activities. This document is essentially technical, but I recognise that to have impact, issues of process and ownership would need to be addressed.

3. What is vulnerability? A framework for analysis

3.1 Defining poverty, risk and vulnerability

- *Poverty is acknowledged to be multidimensional. There is no reason to limit a concept and measurement of vulnerability to income, consumption or other money-metric dimensions only, even when using quantitative means. Vulnerability related to dimensions such as educational opportunities, mortality, nutrition and health could be measured as well.*

First, it is helpful to be clear about what we mean with poverty, risk and vulnerability. The focus is on agreeing useful definitions from an operational point of view. Poverty is now widely recognised to be multidimensional, both in terms of its characterisation and experience. Even if one tries to use quantitative measures to describe poverty, there is no reason to limit to monetary measures. A number of non-monetary measures, including nutrition, education or health indicators provide straightforwardly measurable indicators of non-monetary dimensions. For our purposes, we will consider the measures underlying the International Development Targets as our outcome indicators, describing different poverty dimensions. In particular, poverty refers then to being deprived of basic levels of economic well-being (absolute income poverty) and human development (including universal primary education, girls' access to primary and secondary education, infant, child and maternal mortality).

- *Risk relates to events possibly occurring, beyond the direct control of individuals and households. The focus in work on vulnerability should be on down-side risk.*

A working definition of risk is also useful. The risk faced by an individual relates to events *possibly* occurring, i.e. with less than certainty. Individuals have *a priori* some sense of the likelihood of these events occurring, without direct control over this likelihood[8]. Risks could be related to the environment or climate, to the persons health, but also to actions of others or to policy measures, etc. The lack of *direct* control over the risk they face is crucial and distinguishes it from the responses one can observe from individuals, households and communities given the risk they face. In principle, risk can be 'up-side' ('a lucky draw') or 'down-side'. For our purposes, I will mainly focus on down-side risk, i.e. on harmful events.

- *For operational use and measurement, vulnerability should always be defined relative to some benchmark. In poverty policy contexts, vulnerability to poverty, in its various dimensions, is the appropriate concept. Vulnerability is the product of risk, but also of household conditions and actions.*

[8] Formal economic models typically assume that this frequency distribution is complete, although it is subjective, i.e. it does not need to be correct a priori. Completeness of the frequency distribution distinguishes risk from the traditional concept of (so-called Knightian) uncertainty, where the probability of events occurring are assumed to be unknown. Introducing this distinction is not necessarily going to change much of the analysis in this paper. In this paper, I will follow the standard practice in economics of using uncertainty to refer 'to not knowing which state of the world will occur', given many possible states of the world, while risk describes these different possible states of the world, assuming that each person has some subjective belief of the frequency distribution of these states involved.

Different ideas about the meaning of 'vulnerability' can be found in the literature. Alwang et al. (2001) provide a stimulating, critical review of the different concepts prevalent in disciplines such as economics, anthropology, sociology, public health, etc. In general, there is some consensus that vulnerability is best defined relative to some benchmark of ill-being (Alwang et al. (2001)). In this paper, when preparing for operational use and measurement, vulnerability will always be qualified as 'vulnerability to poverty'. For individuals, and taking into account the different dimensions of poverty, this implies that measurement should focus on measuring individuals' vulnerability to absolute income poverty but also on vulnerability for not being able to complete primary education, vulnerability to mortality before the ages of one, five or due to pregnancy-related complications or vulnerability to malnutrition[9]. Obviously, there is no a priori reason why these different measures of vulnerability should be identical. While risk is exogenous, vulnerability is endogenous: individuals take actions, alone or with others, to affect their own vulnerability. In fact, much research has focused on the sophistication and complexity of the ways ('strategies') individuals try to affect their own vulnerability[10].

3.2 A framework for analysing risk and poverty

- *In this section, I borrow from economics to describe a framework for analysing first poverty and then the links with risk and vulnerability.*

There are different ways to clarify the link between risk, poverty and vulnerability. I will borrow from economics, as formalised by researchers working on risk in poor village economies. Parallels with other approaches, including the food security literature or the livelihoods approach, will be obvious. The purpose is to highlight the issues that vulnerability analysis should focus on.

- *The framework focuses of households consisting of individuals and being part of groups and communities. Households and communities are units of conflict and co-operation.*

Conceptually, households are the unit of analysis. They consist of individuals and belong to communities, where communities is the generic term for villages, ethnic groups, extended family and other social networks. Households and communities are entities of co-operation but also of potential conflict. As long as this point is acknowledged, the focus on households rather than individuals is not problematic.[11] In this paper, I will not focus on intra-household conflicts in relation to vulnerability. This is mainly due to having already a large agenda to cover, rather than any suggestion that this dimension is unimportant.

[9] In the nutrition literature, it is often argued that child and adult malnutrition measures (e.g. height over age or weight over height for children, the Body Mass Index for adults) are vulnerability measures, since they measure the probability of suffering nutrition related morbidity or mortality. I do not use them in the paper in this way, but will e.g. consider the vulnerability to future malnutrition.

[10] For a discussion from the perspective of economic research, see Dercon (1999). For a discussion using the livelihoods approach, see Davies (1996).

[11] In the economic literature on risk and insurance, this is incorporated by using co-operative (collective) or non-co-operative models of intra- and inter-household allocations to test the extent of mutual protection. See Dercon (1999).

- *Households and individuals have assets, such as labour, human capital, physical capital, social capital, commons and public goods at their disposal to make a living.*

Households have certain assets and endowments (with possibly differential power to use them within the households). They are transformed into different forms of incomes, which in turn entitles them to goods and services, which then allow households to be able to obtain levels of well-being in different forms. Table 2 summarises these links. I will discuss them now in more detail.

Households and individuals have assets at their disposal to make a living. These assets include labour and human capital (health endowments, education) and capital goods as they are traditionally understood (physical capital, financial capital). Households typically also have access (possibly with rules) to common property – e.g. common land, water – and to public goods – roads and other infrastructure. Finally, they have social interactions and are part of communities. The value of these social relationships are an important asset: this is referred to as social capital, the stock of social institutions and more informal networks to which the individual or household belongs, including the norms and values governing its functioning[12].

- *Assets are used to generate income in various forms, including earnings and returns to assets, sale of assets, transfers and remittances.*

Individuals and households use these assets to get involved in income generating activities, or let other people use them, earning a return on their assets. There is no need to have income generation in the form of cash – using assets to produce for own consumption is obviously possible too. Other ways of generating incomes is to sell assets – but there is obviously a limit to this, since it comes at a cost of future income generation. Income can be derived via credit – effectively a current return on the potential value of your assets. Finally, income can be obtained from remittances and transfers from other households and individuals, or from anonymous institutions, such as the state or NGOs. Transfers and remittances can be seen as a return to forms of social capital.

- *Incomes provide access to dimensions of well-being: consumption, nutrition, health, etc., mediated by information, markets, public services and non-market institutions.*

Incomes provide possibilities to obtain consumption, nutrition, health and other dimensions of well-being. This is link is not direct: it requires a transformation mediated by markets (purchases of goods and services, the functioning of markets), public services (such as the supply of health or education services), non-market institutions (norms, rules, power, e.g. between households or within the household) and knowledge and information about the opportunities for transformation available.

[12] There are as many definitions of social capital as researchers using the concept. Still, the spirit is generally as described here.

Table 2 A framework for analysis

Assets	*Incomes*	*Well-being - 'Capabilities'*
• Human capital, labour • Physical/financial capital • Commons and Public goods • Social Capital	• Returns to activities and assets • Returns from asset disposal • Savings, credit and investment • Transfers and remittances	ability to obtain *(inter alia)* • Consumption • Nutrition • Health • Education
Examples of Risk (a)	*Examples of Risk (b)*	*Examples of Risk (c)*
• loss of skills due to health or unemployment • land tenure insecurity, uncertain titles to other assets • asset damage due to climate, war or disaster • access to commons and unclear commitments regarding public goods • violations of commitment and trust • loss in value of financial assets or pension funds linked to inflation, stock market or exchange rate collapses.	• output risk due to climatic shocks, disease, conflict • output price risk • covariance in incomes and asset prices • risk in asset returns from savings and investment (including inflation) • uncertain access to inputs or cash flow support during production • imperfect enforcement of contracts, such as payment for goods or services rendered • uncertainty about enforcement of informal arrangements, including informal protection – for example, transfers and remittances may not materialise • uncertainty regarding rationing in public support, for example, risk of exclusion from safety net • imperfect information and knowledge about opportunities • risks in policy environment – credibility and commitment to continue policies	• price risk in food markets • food availability and rationing risk • uncertain quality of public provision in health and education • uncertainty about rationing scheme employed in health or education • imperfect knowledge about health and nutrition 'production' (uncertainty about right answer)

- *Households actively build up assets, not just physical capital but also social or human capital, as an alternative to spending.*

Assets are not just given – households actively need to build them up and maintain them. This implies that income is not just used to obtain consumption at present, or to obtain nutrition or health to contribute to current well-being. This introduces an important dynamic element in household strategies via savings and investment. Investment can occur in various forms, beyond its traditional use of the term related to physical capital accumulation. Investment can occur in skills and education, but also in social capital: e.g. providing transfers and remittances (in cash, in kind or in the form of labour) as part of some reciprocal or other arrangement at the individual, household or community level. Investment can also occur in the forms of financial and other forms of savings (including stocks) for later use.

- *Generating incomes from assets is also constrained by information, the functioning of markets and access to them, the functioning of non-market institutions, public service provision and public policy.*

The transformation of assets into incomes (and vice-versa) is also not self-evident: it is crucially determined by the functioning of and access to markets, including the presence and imperfections of factor markets (such as for credit, insurance, products, inputs), the knowledge and information available to households on these markets, the role of public policy and institutions in facilitating or hindering these markets, including in assisting enforcement of contracts and arrangements. These factors will determine the type of activities available to households, the type of assets that can be bought or sold, possibilities for savings and investment, etc.

- *Poor households are seen in this framework as weighing current survival and well-being, with decisions affecting their future possibilities, severely constrained in their options by their assets and the conditions they face.*

In this framework, households can be best thought as trying to plan and to make decisions not just about today, but in a dynamic sense (over time) and taking into account uncertainty ('across possible states of nature'). Decisions by households about assets and incomes are taken in the context of uncertainty regarding outcomes, due to the risky environment they live in. Economic approaches in this framework tend to focus on the constraints faced by households and individuals in trying to make these decisions – due to limitations in the information available, the imperfections in the market environment, including market imperfections that are only partly substituted for by alternative non-market institutions or public institutions. A useful example are the problems related to problems in insurance markets related to information and enforcement, for whom 'traditional' or public social security solutions exist, resulting in partial insurance. Before turning to these, it is useful to expand on the role of risk in this framework.

3.3 The role and nature of risk

- *Risks are faced at various steps in this framework. They do not just relate to environmental or epidemiological factors. Risks involve also markets, public policy and social capital. Assets, their transformation into incomes and in turn their transformation into dimensions of well-being are all subject to risk.*

Typically, risk tends to be rather simplistically understood as mainly related to environmental factors, such as climate, water management, plant diseases or other pests, as well as the epidemic spread of viral, bacterial or other infections linked to water or insects. Obviously, they are very important but it would be misleading to focus only or too much at these forms of risks. Furthermore it is useful to be specific about the way risk affects the different levels of the determinants of well-being (see also the examples in table 2).

- *Assets are subject to risk themselves. Examples include destruction due to environmental factors or conflict, the erosion of human capital due to health or unemployment, the collapse of asset markets and values, problems with property rights and their enforcement, risks in social capital and access risk to public goods and commons.*

First, assets are risky, in the sense that whether the household can control their use is dependent on risky factors.

- For example, the value of physical assets, such as land and livestock, is dependent on the form and *rules governing property rights.* In many context, land insecurity is prevalent, from the threat of eviction from common or traditional land to the limits to enforcement of formal land titles, for example due to customary rules, corruption or weak legal enforcement of contracts.
- *Access to social capital is also risky*: most rule and norm behaviour is consistent with at times deviant and exceptional behaviour; trust may at times be violated, etc. Informal arrangements may collapse in certain exceptional circumstances, beyond the control of the individual or household. Rule of law may also be risky: arbitrary behaviour by law enforcement agents, such as police or judiciary, also implies lack of security of access and opportunities.
- *Access to public goods or the commons* may also be uncertain: rights may be withdrawn or there may be uncertainty about whether specific user fees to previously free public goods would be imposed.
- *Human capital* may be eroded due to health problems but also due to unemployment (called 'hysteresis' effects in labour economics), implying that this possibility needs to be taken into account when making decisions at present.
- The value of financial investments or pension funds may also be eroded due to inflation and exchange rate collapses.
- Finally, and most obviously, *physical assets* may be destroyed or lost due to *environmental factors* – flooding, storms, drought, or due to reasons such as crime, *conflict* and war. There are also similar risks related to storage of commodities, including food stocks.

- *The transformation of assets into income is also subject to risk. Beyond obvious but important factors such as climate or health, one should focus on (inter alia) price risk, the covariances between different income risks, risks to access of rationed inputs, risks of exclusion from informal or formal safety nets, problems related to contract enforcement and risks to changes in policy.*

The combinations of assets ('production factors') into output and income is also a risky process, while savings or transfers are also affected by uncertainty *ex-ante.* Some further examples:

- Again, the most obvious ones relate to *climate, illness, disease, disaster, crime and conflict*: e.g. your crops may be destroyed because due to drought or because you could not work on the fields when you needed to weed, etc. Similarly, cows may not give milk when animal feed becomes too scarce, or offspring (another form of return to cattle) do not survive until after birth.
- Another risk factor relates to *prices* – one cannot know with certainty what prices will be fetched for production when starting the activity, due to time lags – in agriculture at least one season, but for permanent crop decision obviously over a much longer time horizon.
- *Price and quantity risks* also affect decisions about *savings and investment*: beforehand, the return obtained from assets when used in production is uncertain. Similarly, the prices when assets are disposed off to generate cash is not known with certainty either – indeed it is uncertain when one would like to sell such an asset.
- *Covariate risk* is important. One will always have to take into account other people's behaviour as well: if all enter into particular activities or all use the same asset to dispose off when in need, this would affect the prices; these covariances may well be self-defeating[13].
- *Uncertainty about constraints in factor markets*, in particular regarding access when needed. The options available are typically constrained: market imperfections may restrict the activity portfolio available to households. For example, despite the prospect of future earnings, credit markets may not function well, i.e. they do not offer loans without physical or financial capital as collateral, despite the presence of profitable activities. Or oxen rental is not possible due to 'moral hazard' (owners would worry that you would harm the animal). The important point for our purposes is that these *constraints* from market imperfections usually involve a large degree of uncertainty: when choosing your activities, you may not know yet for certain whether later in the production process, you would be able to get the crucial inputs.
- Another source of risk is the *imperfect enforcement of contracts*, such as payment for goods or services rendered. While typically, contracts may be enforceable (or at least one would know more or less how well on average), there is uncertainty

[13] I discuss this in more detail below, but the standard example is cattle and small livestock as a bufferstock to sell when harvests and alternative safety nets fail, as in some of the cases in Sen and others' classic analysis of famine in the Sahel and Ethiopia. The collapse in prices triggered entitlement crises, proving the asset close useless to cope with the loss of other income sources.

regarding the specific experience one will have, for example one may be unlucky to deal with a non-complier without knowing this beforehand.

- There are also *risks related to informal support networks*: it often cannot be taken for granted that support will actually materialise when needed, even if the usual rules would demand it. Remittances may not be sent or transfers may not be received.
- Another risk is related to the *policy environment*. The credibility and commitment to continue or change policies in a certain direction is never perfect – the more uncertain this is, the more risk this implies for households and individuals making a living.
- A specific risk should also be mentioned, related to public support programmes. In principle, government may want to guarantee transfers from a safety net, possibly provided certain conditions are met. However, programmes are often rationed (e.g. food-for-work programmes rarely have unlimited scale), or the information used for targeting may be imperfect, so individuals do not know beforehand whether *they* will receive the transfers. These risks related to poor targeting and uncertainty regarding the rationing scheme, or in general, the *risks of exclusion from the public safety net*, may well be substantial.

- *Entitlements from incomes are also mediated by risk, including price risk but also and importantly, risks related to imperfect information and to the provision of public goods and services, especially since they often are rationed.*

Finally, the transformation of 'incomes' into 'capabilities' or well-being is also not self-evident. The entitlements from incomes and other sources of entitlement are usually not without risks.

- The most obvious source of risk regarding entitlements from income relates to *price risk for basic commodities*, especially for food. Sudden food price rises have played an important role in the development of some famines, with the Bangladesh famine in 1974 an obvious example.
- *Risks in public food distribution systems.* Alternative systems, such *price controls and food rationing*, while seemingly a response to limit some of these price risks, are similarly liable to risk: availability at these lower or stable prices may not be fully guaranteed in all circumstances, while rationing typically involves uncertainty about whether rights to the ration will in practice be met or, if rationing implies queues or other schemes, there is uncertainty related to being able to get the ration.
- *Public services* are often characterised by rationing and non-market clearing price setting – resulting for example queues in health provision, regular stock-outs in drugs or teaching materials, absenteeism of teaching or medical staff. While it may be known with certainty that there are problems, but only with uncertainty whether the individual will be affected on the days or in the particular facility being used, this will create further risk for the individuals involved. In other words, uncertainty about when the service will be delivered and when not – i.e. whether demand will be met – will affect entitlements from income and public goods. This is an important risk, especially when considering dimensions of well-being such as health and education. It is worth to expand on this with an example. Clinics do often not have staff permanently available, e.g. sometimes they may not have transport to get to the

facility or they get involved in moonlighting. While the average level of staff availability is a useful statistic for the clinic, from the point of view of the household making decisions about going for modern health care when ill it matters to know whether the professional will be available or not, especially if visits are costly in actual and opportunity costs. For example, suppose everybody knows that staff is typically only three days a week available, but it is not known with certainty when staff will be there. Individuals visiting on the particular days when the staff are there will be helped, those visiting on other days will not be helped; households do not know when this will be the case. Since the households will plan according this uncertainty, and if there are costs to visits, then there will be fewer visits than optimal even on days with staff available, while on days without staff there will be 'too many' visits – i.e. they are all wasted. If households knew with certainty which days services were delivered, then on days with staff availability when ill they would visit, and on other days not incur the unnecessary costs. In short, the uncertainty implies poorer health and wasted resources for households.

- Closely linked to this are the information *risk related to the quality of public provision of services*, such as health and education: individuals and households have very little idea about whether different services offer quality. This is related to the trust (and controls) in the system, the control efforts expended, the transparency of organisations and the efforts in passing on information to households and individuals.
- Individuals typically have *imperfect knowledge* about how income can be transformed into good health and nutrition ('health production'). For example, this can result in uncertainty about the correct treatment for simple diseases. Since households and individuals will use their own subjective beliefs about risks, this will affect outcomes.

- *Risks related to policy, public services, access to commons and public goods, risks to access and the functioning of social capital and risks of exclusion from formal and informal safety nets are largely ignored in standard approaches, such as in WDR 2000/01.*

It is worth highlighting that the list of *sources of risk* given as examples in table 2 are quite different from those typically reported. For example, table 3 is a table taken from the World Development Report 2000/01. There is no doubt that some of their examples are important. However, these risks are mainly related to income risks – while risks related to insecurity of assets are not mentioned. The key dimensions missing are those risks related to public goods and services, and those related to social capital (including rules governing property rights, enforcement of the rule of law, access to commons and risks related to trust and commitment – which is not simply the same as risks related to crime and violence). Furthermore, no attention is paid to problems related to the transformation of income into outcomes, at least not explicitly. In particular, by focusing on a broader set of welfare outcomes than directly linked to income – such as health and education – the importance of the risks related to the public provision of services, including price-setting, rationing, quality and information become more apparent. Finally, risks related to generating income from informal and formal safety nets – essentially problems of enforcement of rights, as well as uncertainty about the extent of imperfections in factor markets and problems of contract enforcement – were also excluded from this analysis.

Table 3 Types of risks (alternative examples)

Type of risk	Risks affecting individual or household	Risks affecting groups of households or communities	Risks affecting regions or nations
Natural		Rainfall Landslide Volcanic eruption	Earthquake Flood Drought High winds
Health	Illness Injury Disability Old age Death	Epidemic	
Social	Crime Domestic Violence	Terrorism Gang activity	Civil strife War Social upheaval
Economic	Unemployment Resettlement Harvest failure		Changes in food prices Growth collapse Hyperinflation Balance of payments, financial or currency crisis Technology shock Terms of trade shock Transition costs of economic costs
Political		Riots	Political default on social programs Coup d'état
Environmental		Pollution Deforestation Nuclear disaster	

Source: World Development Report 2000/01, p.136.

- *Most households and individuals are aware of the existence of these different sources of risk and households actively try to cope with this risk in a variety way, using well-documented strategies.*

Since different sources of risk will affect their ability to obtain a level of well-being, individuals and households will try incorporate this information as well as they can in their decisions and strategies, however difficult. Risk will not only affect their outcomes, it will crucially affects their choices and they will actively try to plan and handle to obtain sufficient security and well-being[14]. The risks defined are beyond their own control, but they can act to influence their own outcomes despite the risks faced.

The strategies to handle risk and its consequences as used by the poor are diverse. It helps to group the strategies. Different ways are possible. The World Development Report 2000/01 used the following classification (table 4). They distinguish different objectives and different mechanisms. Some sub-set of the informal mechanisms is typically available to the poor; the formal mechanisms, both market and publicly provided, are much more rarely provided to the

[14]Arguably, the study of survival strategies in the face of multiple sources of risk is a most plausible setting to apply basic microeconomic theory, especially for its crucial assumption, maximising behaviour – actively trying to do as well as one possibly can, given the asset and informational constraints faced.

poor (I will return to this later). The WDR 2000/01 has an extensive discussion of this table (pp.140-146). The mechanisms are characterised by different objectives: a first group tries to affect the risk faced itself, by ensuring that certain sources of risks become less relevant – changing occupation, moving to other (less risky) areas, managing commons or other preventive measures are examples[15]. Often, reducing risk is not an option, so households try to mitigate risk – via diversification strategies – so that the *overall* income risk is smaller than risk faced from each of the constituting sources of income. Forms of mutual support, reciprocal exchange and insurance mechanisms are also used to mitigate risk. Finally, 'coping' with risk refers to actions when the other mechanisms fail, including selling assets, taking child from school and making them work, reducing consumption and relying on support from others[16].

[15] Note that this does not mean that the risk disappears – this risk is beyond the control of individuals – but that indvidiuals, households or communities find ways to reduce its relevance for them.

[16] Note that some have a 'distress' element in them (cfr. the famine literature), i.e. the short term benefits are combined with serious long-term damage. Coping strategies as understood in the famine literature typically have this characteristic. However, not all sales of assets have this characteristic: assets may have been built up specifically for this purpose.

Table 4 Mechanisms for managing risk

Objective	Informal mechanisms		Formal mechanisms	
	Individual and household	**Group-based**	**Market based**	**Publicly provided**
Reducing risk	• Preventive health practices • Migration • More secure income sources	• Collective action for infrastructure, dikes, terraces • Common property resource management		• Sound macroeconomic policy • Environmental policy • Education and training policy • Public health policy • Infrastructure (dams, roads) • Active labour market policies
Mitigating risk				
Diversification	• Crop and plot diversification • Income source diversification • Investment in physical and human capital	• Occupational associations • Rotating savings and credit associations	• Savings accounts in financial institutions • Microfinance	• Agricultural extension • Liberalised trade • Protection of property rights
Insurance	• Marriage and extended family • Sharecropper tenancy • Buffer stocks	• Investment in social capital (networks, associations, rituals, reciprocal gift giving)	• Old age annuities • Accident, disability, and other insurance	• Pension systems • Mandated insurance for unemployment, illness, disability, and other risks
Coping with shocks	• Sale of assets • Loans from moneylenders • Child labour • Reduced food consumption • Seasonal or temporary migration	• Transfers from networks of mutual support	• Sale of financial assets • Loans from financial institutions	• Social assistance • Workfare • Subsidies • Social funds • Cash transfers

Source: World Development Report 2000/01, p.141.

- *Risk is quite different in size, likelihood and frequency over time. Different characteristics of risk have different implications for the ability to cope with them, as well as for policy.*

Not all risk is the same, in its magnitude, likelihood and frequency over time, as well as the extent to which it affects different people at the same time. It is useful to consider some of the patterns related to risk, since they have quite different impacts on the ability of individuals, households, communities and other institutions to cope with them (Morduch (2000), Holzmann (2001)). The simplest form of risk would be that shocks may occur in various forms, but once is has occurred, the next period the fact that it has happened before has no impact. Statistically, this is referred to as independently identically distributed risk. In general, this is easiest to deal with – whether by individuals, communities, markets or the state. Examples would be most basic health risks (flu, simple infections) or climatic risk in temperate climates. However, much risk is not characterised in this simple way.

- *Characteristics include the extent of state dependence or correlation over time, whether the shocks are rare but very large, whether the shocks are occurring at the same time across individuals, rather than individual-specific.*

First, some risks have patterns over time: if a bad event occurs, then this does affect the probability that it will strike again. Some health risks behave like this. Violence and conflict are typically also like this: once one event has undermined trust and stability, the likelihood of further conflict increases as well. This is referred to as *state depen*dence. Other sources of risk may come in cycles: flooding or earthquakes do not usually occur once but a few times in relatively short period of time is common. Price fluctuations, including for internationally traded commodities, often come in cycles. Apparently, coffee and some fruit harvests are typically in cycles, where a bad one will followed an exceptionally good harvest. Risks that come in cycles tends to be referred to as *autocorrelated risks.* Both state-dependence and autocorrelation make coping harder, whether by individuals, communities or markets. Another distinction is between *catastrophic versus non-catastrophic risks* – i.e. the size of the shock can be quite different. Some events have very low likelihood but its impact can very large – which means they are much harder to plan for by individuals. In fact, even insurance markets find it hard to cope with these shocks. Finally, it is important to distinguish between risk that only affects relatively few individuals and risk that affects a large number of people in a community or region. A number of terms are used to make this distinction in practice: individual-specific, or *idiosyncratic* risk versus common, aggregate, systemic or *covariate* risk. The important point about this is that *covariate* risk tends to affect markets and communities – so that most market-based or community and network-based systems cannot easily cope with these risks. It also has the characteristic that other markets and the macroeconomy would tend to get affected. The state would then also find it hard to deal with this type of risk. The spillover on cattle prices from everybody selling cattle to generate cash in a crisis, and on food prices from a sudden rise in market demand for food in otherwise surplus areas are examples of covariate risk. Note that covariate risk is also sometimes used for *risks* occurring together (even if idiosyncratic): an example is that unemployment and illness may come together for a landless worker.

3.4 Defining vulnerability and its causes in this framework

- *Well-being and poverty are the ex-post outcome of complicated decision process of individuals and households over assets and incomes, faced with risk. Vulnerability to poverty is the ex-ante situation, i.e. before one has knowledge of the actual shocks that will occur. Vulnerability is determined by the options available to households and individuals to make a living, the risks they face and their ability to handle this risk.*

In 3.2, a framework was suggested to understand how individuals and household take decisions using their assets and incomes to generate some level of well-being. Poverty is the ex-post outcome of this process, if an individual cannot generate some (socially acceptable) minimum level of capabilities to have a good life – in other words, when they face deprivation in different dimensions of well-being. Risk has been shown to complicate decision making over assets and incomes considerably, affecting outcomes. In section 3.3, I also discussed some of the different strategies available and used to manage risk and its impact on outcomes. How does vulnerability enter into this framework?

Poverty, in terms of the inability to reach some minimum level or state of well-being, is the *ex-post* outcome of a process, in which individuals and households make decisions about assets and incomes, while faced with a variety of risks. Vulnerability to poverty describes the outcome of this process *ex-ante*, i.e. considering the potential outcomes rather then the actual outcome. It measures or describes the *exposure to poverty* rather than the poverty outcome itself. It refers to some future state, rather than the present. Poverty is measured at a point in time, 'a snapshot', but vulnerability is essentially forward-looking, using the information at a particular point in time. Vulnerability to poverty is then determined by

(i) the options available to households (individuals, communities) to make a living (including assets, activities, market and non-market institutions, public services provision),
(ii) the risks faced by households and individuals when making a living and
(iii) the ability to handle this risk.

- *Measures could be derived of vulnerability to poverty in its various dimensions. There is no reason to limit it to income poverty.*

This can be applied to different dimensions of poverty: there is no reason to presume that the exposure to malnutrition, to poor educational opportunities or to income poverty should be the same for households. For example, in an economy most likely to grow, but facing a potential collapse in public services, the exposure to income poverty and the risks related to transforming income into good education for children is likely to be different and moving in different directions.

- *Vulnerability to poverty measures will have to take into account how likely 'bad' situations will occur, including those outcomes that can be well predicted.*

In section 4, I will discuss in more detail possible measures. A measure of vulnerability as an ex-ante welfare outcome will imply a statement about how likely 'bad' states (dimensions of poverty and ill-being) are to occur in the future, i.e. the probability of poverty for each

individual. However, it would be misleading to suggest that vulnerability only has to do with risk. As an *ex-ante* measure, it is important to include all possible reasons for future poverty, including those that can be 'measured' beforehand with (near) certainty. For example, it makes sense to include the 'permanently' poor, i.e. those that stay poor over long periods of time, in the 'vulnerable to poverty' population, and make vulnerability not just a characteristic of the non-poor or the temporary poor (although there is some debate about this, e.g. Ravallion (2001), Kamanou and Morduch (2001), Alwang et al. (2001))[17].

- *The vulnerable consist of four groups: the permanently poor, those becoming permanently poor in the future due to some trend evolution, those that are likely to become poor due to predictable events (such as seasonality) and those likely to become poor due to risk and shocks.*

As a consequence, it is possible to consider at least four reasons why a particular group or community would be vulnerable to poverty, i.e. to be below some accepted minimum level of well-being in the future, as seen from the present. First, because they are currently poor and there is no change expected over time, e.g. because the assets they have access to make a living and entitlements they generate are insufficient to reach a reasonable level of well-being. They tend to be called the '*permanently poor*'. Secondly, because some may not be currently poor, but because of the evolution over time of the conditions faced by them, they can be expected to become poor in the future, e.g. because the assets they have access to are becoming eroded, the activities they can get involved in become less lucrative or the public services or safety net they relied on to make the difference is becoming eroded. They are expected to slip into poverty 'permanently' due to some *trend*, i.e. *to become permanently poor*[18]. Thirdly, those currently non-poor but expected to become 'poor' at some later date, not due to a trend but due to some (predictable) *fluctuations*, with which they cannot cope. An example would be *seasonal fluctua*tions in food consumption and nutrition. Surely, a seen from the post-harvest period, they should be counted as vulnerable to poverty. The fourth groups consists of those who face a high likelihood of becoming or staying poor due to their exposure to risky events in their assets, income sources and entitlements to dimensions of well-being. This group is the focus of much of the analysis on vulnerability. The first two groups receive generally ample attention in the debates about poverty *per se*. The seasonal dimension has generally been ignored in the economic literature (with some notable exceptions[19]) and debate about measures of vulnerability, but this is an important oversight, given the apparent difficulties of households to deal with seasonality in many of the poorest developing countries[20]. In general, non-risk factors should not be ignored in discussions about

[17]Both WDR2000/01 and some of the more recent World Bank views on Social Protection (e.g Holzmann (2001)) appear to focus exclusively on risk as a source of vulnerability, even though they do not want to exclude the 'permanently poor' specifically from their measures. This is understandable – in a world without risk, the ex-ante versus ex-post discussion is rather irrelevant. Since no-one is immune from risk so that it also affects the 'permanently poor' – it can make them worse off – it is still useful to consider them in any concept and measure of vulnerability, especially if it would be used to assess the impact of policies against. When discussing measures in more detail, I will distinguish the concept of 'chronic poverty' as well (Ravallion (1988)).

[18] The opposite group is important too: those currently poor but expected to leave poverty permanently, i.e. to become chronic non-poor. This implies that not all those currently poor may have to be counted as vulnerable to poverty.

[19] E.g. The book edited by Sahn (1984).

[20] Seasonality refers to seasonal patterns in prices and earnings. It is predictable. As a consequence, even with perfect insurance markets, seasonal price movements would still be present; in general there is in itself no

vulnerability, since they interact with risk factors to generate the observed (and potential) outcomes[21].

4. A measure of vulnerability?

4.1 Outcome-based measures: characteristics

- *An outcome-based measure of vulnerability needs to be forward-looking and measure a situation before all uncertainty has been removed, i.e. 'ex-ante'. This implies that the key problem is to derive credible measurement of all possible outcomes, including their likelihood.*

In section 3.4, I have pointed to some of the key characteristics of vulnerability. Vulnerability to poverty describes the 'ex-ante poverty'. Individuals and households make decisions about assets and incomes, while faced with a variety of risks. Ex-post, when all uncertainty about *current* conditions has been removed, poverty occurs if levels of some of the dimensions of well-being are below some (socially accepted) minimum level. For some of these dimensions, this can be measured – resulting in measures of malnutrition, poverty, educational opportunities, etc. In what follows, I assume that some dimensions of poverty can be convincingly measured, so that they are comparable across space, time and groups within a society[22]. The measurement problem related to vulnerability is whether one can convincingly measure 'ex-ante' the possible outcomes of the process and their probability of occurring, when one is not clear yet which of the possible 'states of the world' will occur, where the state of the world is a particular combination of outcomes of different sources of risk, or in other words, before uncertainty has been resolved. Since the measure is by definition forward-looking (based on the information available at a particular point in time), one will need to be clear about the time horizon involved (next year, next month, etc.)

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contradiction between seasonal price movements and perfectly functioning markets (since this involves a return to storage over time). However, asset and product market imperfections cause far more substantial movements than needed. When markets function properly, farm households should be (more or less) indifferent between storing themselves the food or selling post-harvest and saving/investing the earnings from the sale to buy again in the months preceding the harvest. Similarly, workers should have the possibility to earn during busy seasons and rely on credit or safe savings possibilities in lean seasons to acquire food. Limited access to efficient household storage facilities, lack of credit, poor savings opportunities and product market imperfections make these strategies very costly. The result is that even households doing the best they can end up suffering low food entitlements and other problems in lean seasons.

[21] In the economics literature on poverty, a distinction is made between 'chronic' (or 'permanent') poverty on the one hand and 'transient' (or 'transitory') poverty (Ravallion (1988)). The latter refers to poverty that is typically only 'temporary'. To focus on risk- and non-risk related transient poverty, some have suggested to use 'stochastic' poverty for risk-related poverty. Note that this is not meant to refer to risk-related poverty traps, but to transient parts of poverty caused by 'shocks' (Morduch (1994)).

[22] For example, income poverty can be measured using a poverty line, applied to income or consumption data, appropriately deflated. Mortality is not problematic in this respect. Illiteracy or no access to primary education (measured via enrolment statistics) can form appropriate education measures. Following standard practice, stunting and wasting of young children can be measured relative to deviations (of more than two standard deviations) from a healthy population.

- *The complications arise from the fact that different situations 'ex-post', i.e. so-called 'states of the world', all imply quite different levels and distributions of these outcomes.*

This can be made clearer by an example. Consider a country with known risk of drought and some safety net mechanism, which is known that is not terribly well organised. Donors contribute aid, often in the form of food aid when asked. Let us consider one dimension of poverty, child malnutrition. Ex-post, poverty is quite high, with relatively high levels of wasting and stunting. However, it is clear that depending on the actual conditions, the 'state of the world', the ex-post outcome will be different. Consider a few examples of 'states of the world':

(i) drought, broad access to a safety net and food prices stable,
(ii) drought, high food prices and funds for a safety net diverted due to corruption,
(iii) drought, high food prices, access to safety net but insufficient means to provide sufficient support since food aid did not arrive in time
(iv) no drought, a reasonable harvest, very low food prices due to unnecessary release of food aid onto the market
(v) no drought, a bumper harvest, normal prices,
etc.

In each of these situations, the number of malnourished children is going to be quite different. A vulnerability measure should take into account that different 'states of the world' are possible, and try to make some statement about the extent of the vulnerability in the population *ex-ante*. In making this judgement, an understanding is required of what the ('counterfactual') outcome in terms of malnutrition would be in these different possible situations.

- *Measurement of outcomes implies that one needs to take into account not just the risks faced but also the options and ability to handle these risks.*

Recall in this respect that vulnerability to poverty is (*inter alia*) determined by the options available to households to make a living and the ability to handle different risks in doing so. This last characteristic is important: to assess the different outcomes one will need to take into account the differential ability to handle the consequences of different 'states of the world'. Note also that different households and communities may have differential ability to handle specific conditions. For example, in the example above, a farmer dependent on selling small amounts of food to generate cash to pay for health and education may suffer in case (iv) if food prices collapsed even though the harvest was fine, although it may find (ii) or (iii) quite bearable since despite low harvests, prices have kept up to compensate for the lower output. A deficit farmer dependent on off-farm activities may find (ii) or (iii) especially difficult, since it needs to generate extra cash but finds lower demand for its services and a poorly working safety net, while (iv) may well be quite good. Vulnerability to poverty should take into account this diversity of experiences under different conditions.

- *The aim is to construct distributions of outcomes in each possible situation.*

The result is that *ex-ante*, one needs to get indicators for deprivation or poverty in each state of the world for each person. Provided that one can incorporate some information or judgement about the likelihood (the probability) that each state may occur, it would be possible to obtain a measure or statement about overall vulnerability of individuals and a population. Since these possible outcomes can also be traced back to particular groups of households, one can also make statements about the group-specific vulnerability. For example, taking the malnutrition example further, vulnerability of children in region A versus B, in remote areas versus towns, in different types of families, etc.

- *Given this information, different quantitative measures of vulnerability are possible. For example, one can measure the number of people or the groups that have a probability above 50 percent (or other threshold) to be below the minimum level of well-being for the particular measure used. Above this threshold, individuals or groups could be called highly vulnerable. High vulnerable groups can be distinguished from low vulnerability groups by using different probabilities as cut-off points.*

How could one express this in simple *quantitative* measure? There are a number of problems in practice. To see this, let us work further on the example of malnutrition and the possible states of the world (i) to (v) described above. Suppose one is interested in assessing vulnerability to malnutrition one period ahead (e.g.next year)[23]. Suppose further there are five groups of children in society, each consisting of 20 percent of the population (as if the population consists of five representative children). In table 5, I give (hypothetical) z-scores of (group average) child weight over height ('wasting'). Recall that in a 'normal' population is, about 95 percent of children between 6-72 months will have values between –2 to +2. Values below –2 suggest malnutrition. In table 6, this table is used to describe whether a child is malnourished or not. In each state of the world, a particular z-score would be obtained and the child would be malnourished or not. A cursory look at these tables suggests some of the problems in deriving measures of vulnerability. In each state of the world, quite different average z-scores and related malnutrition measures are obtained. The percentage of wasted children range from 20 to 80 percent, depending on the conditions. The 'expected value' (i.e. probability weighted average) is '50 percent wasting'.

[23] More complex measures are possible. Pritchett et al. (2000) considers vulnerability over more than one period in the future (three years ahead). Elements of his analysis are different, but the underlying ideas of what constitutes vulnerability are quite similar to the example described here.

Table 5 Nutritional Levels (z-scores based on weight over height, children below 6 years of age)

State of the world (conditions)	**(i)**	**(ii)**	**(iii)**	**(iv)**	**(v)**	**Expected z-score**
Probability of occurring	0.10	0.25	0.30	0.20	0.15	1.00
Group 1	-3.0	-2.5	-2.1	-3.3	-2.7	-2.6
Group 2	-1.0	-2.5	1.0	-2.4	-3.0	-1.4
Group 3	-1.5	-2.5	-1.8	-3.0	-1.7	-2.2
Group 4	-3.0	-1.7	-1.6	-2.5	-2.9	-2.1
Group 5	-1.0	0.2	1.0	0.5	0.7	0.5
Average z-score						
Per state of the world	-1.9	-1.8	-0.7	-2.1	-1.9	
Overall (population and states)						-1.6

A few different ways could be used to describe vulnerability to malnutrition for this population. Table 7 gives details[24]. A first set of possible measures use the *probability* that bad states (i.e. situations with bad outcomes) may occur for different groups[25]. First, note that 80 percent of children may wasted in one or more states of the world. In this sense they are vulnerable. In this example, one group will never be malnourished. In reality, it may be possible to think of situations in which anyone may suffer hardship, either due to some general disaster or some combination of individual circumstances, even if the situation is highly unlikely. For certain dimensions of well-being, such as child mortality, the 'bad' state may occur to anyone - the probability is just much lower for certain groups. Since '100 percent' vulnerability is not very helpful as a measure, this suggests that vulnerability measures may also ask for a cut-off point, such as an ex-ante probability of more than 50 percent that the child will be malnourished. In the data this would mean that 40 percent of the children are 'vulnerable' to malnutrition, including 20 percent that are always malnourishment.

[24] On purpose I refer to the ex-post outcomes as poverty. Similar tables could be made for any quantitative indicator of one of the dimensions of poverty (provided a minimum acceptable level or poverty line could be defined).

[25] Measures of this nature are suggested by Chaudhuri (2000) and proposed by Holzmann (2001) as a way forward.

Table 6 Wasting (z<2) based on nutritional levels (z-scores based on weight over height, children below 6 years of age)

State of the world	**(i)**	**(ii)**	**(iii)**	**(iv)**	**(v)**	**Expected probability wasting**	**Probability of wasting ³ 50%**	**Probability of 'ever' wasting**
Probability of occurring	0.10	0.25	0.30	0.20	0.15	1.00		
Group 1	1	1	1	1	1	1.00	1	1
Group 2	0	1	0	1	1	0.60	1	1
Group 3	0	1	0	1	0	0.45	0	1
Group 4	1	0	0	1	1	0.45	0	1
Group 5	0	0	0	0	0	0.00	0	0
Average percentage wasted	0.4	0.6	0.2	0.8	0.6		0.40	0.80
Per state of the world						0.50		
Overall (population and states)								

Table 7 Measures of vulnerability and poverty

	Percentage	**Groups involved**	**Definition (vulnerability)**	
Ex-ante information				
expected poverty	0.50	group	Average wasting across states	
chronic poor	0.60	1,3,4	On average below minimum	
of which permanently	0.20	1	Always below minimum	
high vulnerability	0.40	1,2	50+ percent probability to be below minimum*	Of which 0.20 chronic poor
low vulnerability	0.40	3,4	30-50 percent probability to be below minimum	Of which 0.20 chronic poor
Actual (ex-post) poverty			**High or low vulnerability?**	**Chronic or transient?**
Situation (state) (i)	0.40	1,4	0.20 high and 0.20 low vulnerability	Of which 0.40 chronic and 0.00 transient poor
Situation (state) (ii)	0.60	1,2,3	0.40 high and 0.20 low vulnerability	Of which 0.40 chronic and 0.20 transient poor
Situation (state) (iii)	0.20	1	0.20 high vulnerability	Of which 0.20 chronic and 0.00 transient poor
Situation (state) (iv)	0.80	1,2,3,4	0.40 high and 0.40 low vulnerability	Of which 0.60 chronic and 0.20 transient poor
Situation (state) (v)	0.60	1,2,4	0.40 high and 0.20 low vulnerability	Of which 0.40 chronic and 0.20 transient poor

*=percentage of children with more than this percentage probability to be below minimum nutritional level (z<-2).

Higher cut-off probabilities are also possible, and different measures based on 'high vulnerability' versus 'low vulnerability'. For example, if the cut-off point for 'low vulnerability' would be a 30 percent probability of being malnourished, then this would lead to 40 percent with 'low vulnerability' and 40 percent with 'high vulnerability'[26]. Finally, it is common practice to describe the 'chronic' poor as those whose expected outcome falls below the minimum level of well-being for the particular dimension (i.e. –2)[27]. The transient poor are then those poor that are not chronic poor but currently poor[28]. From that point of view, 60 percent are 'chronically' malnourished – some of who are at times above their expected level and not malnourished. In fact, two-thirds of the 'chronic' poor are not highly vulnerable[29].

- *Vulnerability ex-ante and poverty ex-post will be related but not necessarily involve the same people. There is a priori no reason that those ex-ante identified as highly vulnerable will all be poor ex-post, while low vulnerability may still imply ex-post poverty.*

It is useful to compare these results with what ex-post would be observed. As can be seen, there is a relationship between current (ex-post) poverty and ex-ante vulnerability, so that half to two-thirds of the poor are those with high vulnerability[30]. But ex-post poverty is not the same as ex-ante vulnerability. In fact, although the permanently poor are by definition vulnerable, the chronic[31] poor are not necessarily so (half the chronic poor have only 'low' vulnerability to poverty ex-ante, even though they have on average z-scores below –2).

- *Vulnerability indicators, based on head counts of those with high ex-ante probabilities of poverty, are increasingly found in policy research. For example, work in Indonesia found 22 currently poor but ex-ante vulnerability was 45 percent.*

Indicators as in the first part of table 7 are beginning to appear in policy research (with some variation) (Alwang et al. (2001), Holzmann (2001), Chaudhuri et al. (2001)). To give an example of the information included in them, table 8 gives a poverty and vulnerability profile for Indonesia (1998), based on Chaudhuri et al. (2001). Poverty was found to be 22 percent, but vulnerability was 45 percent, i.e. 45 percent of the population had a probability higher than 23 percent to become poor in the next period. Some of the ex-post poor had very low vulnerability to be poor ex-ante. Some highly vulnerable households were non-poor ex-post

[26] Some authors (including Chaudhuri et al. (2001), Sumarto et al. (2001), Pritchett et al. (2000)) have suggested that the 'natural' cut-off point for vulnerability would be a probability equal or larger than the expected poverty – which in their application is for technical reasons equal to expected vulnerability and to current poverty. While they appear to find it self-evident, the theoretical or conceptual reasons appear weak, linked to them typically considering only idiosyncratic shocks.

[27] This concept is usually limited to approaches using consumption data and a consumption-based poverty line, but it can be expanded to other dimensions.

[28] Note that the transitory poverty measure is not measuring vulnerability, since it is not forward-looking, but only considers the current position and is only based on information from the past.

[29] The reason is that they have quite often (in fact with about 55 percent probability) values signifying no malnutrition, but not far above the malnutrition cut-off point, while when they fall below this level, they are highly malnourished. This is a problem related to the fact that individuals are counted as malnourished or not with equal weight however far they are from the level of –2.

[30] Given the definitions of high and low vulnerability, it is easy to imagine that it would have been possible to have some actual poor not classified as vulnerable – e.g. if they only had a 10 percent probability of being poor in the next period. The data used did not have this characteristic.

[31] Recall that the chronic poor as commonly defined as those whose average or expected level of well-being is below the cut-off point.

after all. This illustrates another point: ex-ante measures are bound to make prediction errors, since stochastic events with very low probability can still occur.

Table 8 Poverty and Vulnerability in Indonesia December 1998 (percentages)

	poor	non-poor	total
high vulnerability	0.05	0.03	0.08
low vulnerability	0.12	0.25	0.37
no vulnerability	0.05	0.50	0.55
Total	0.22	0.78	1.00

Source: Chaudhuri et al. (2001).
High vulnerability is 50+ percent probability to be below the poverty line.
Low vulnerability is 23-50 percent probability to be below the poverty line.
No vulnerability is 0-22 percent probability to be below the poverty line.

- *Vulnerability profiles can also be constructed, comparing vulnerability of different regions or social groups.*

Although it is the headline-figures that typically grab the attention of policy makers, the method can also be applied to form profiles of poverty and vulnerability. Chaudhuri et al. (2001) compare different groups in terms of vulnerability, such as rural versus urban, and construct a spatial map of vulnerability using regional decompositions. The patterns are similar for poverty and vulnerability, but with some striking differences. Both poverty and vulnerability are primarily rural phenomena, with poverty and vulnerability highest outside Java. But, for example, poverty is similar in Sumatra and Central Java but vulnerability is higher. Furthermore, more so than poverty, vulnerability is near universal for the less educated and very small among the highly educated. While intuitively very appealing, this measurement of vulnerability is problematic, including the informational demands underlying the examples in tables 5 to 7 and the strong assumptions needed for constructing table 8.

4.2 Outcome-based measures: techniques and problems

- *These measures are not without problems. The information requirements are high and no straightforward measurement of hypothetical situations is possible via survey data.*

The reporting simplicity of the measures described above is appealing to policy makers. It seems likely that in policy work, this type of evidence will increasingly appear. Therefore it is quite important to understand the informational requirements and assumptions needed to construct this type of tables.

A first and most crucial issue relates to the requirement to have forward-looking information about both possible states and outcomes. Since these conditions have not yet materialised, standard survey work cannot identify them. The method used in the most current applications of this methodology and in related work is essentially to use statistical methods to form a prediction model of future outcomes, based on predicted mean consumption and predicted consumption volatility. This model is then used to establish who is vulnerable to poverty. Table 9 gives some technical details on the approach used by Chaudhuri et al. (2001).

- *Currently, most of the applications used, infer the distributions of possible outcome shocks from error process in cross-section regression models explaining consumption outcomes by household and community variables. This implies strong assumptions about how shocks evolve over time and space. Large common shocks, such as an*

economic crisis, cannot be (well) captured in the measures of vulnerability used thusfar, although surely part of the motivation of this work.

The problem is essentially that to infer anything from cross-sectional data (the typical source of quantitative poverty profiles), strong assumptions how shocks evolve over time and across the population and how households can cope with them in different situations have to be made. Essentially, it is assumed that the error process of a simple prediction model contains sufficient information on all this. One serious problem is that vulnerability to large aggregate shocks, such as on the scale of the East-Asia crisis or a serious drought would not be captured, even though evidence suggests that such events are harder to cope with due to their covariate nature. In all fairness, some of these assumptions also underlie much of quantitative poverty work related to poverty profiles. But the essentially forward looking nature of vulnerability, the diversity of shocks and events that may happen as well as the differential ability to handle different types and sizes of shocks are poorly captured by this approach[32].

Table 9 Determining vulnerability using cross-section data

Formally, the starting point is to consider the vulnerability of particular household h at time t as the probability that the household will find itself consumption poor at time t+1:

$$v_{ht}=Pr\left(c_{h,t+1} \leq z\right) \qquad (1)$$

where $c_{h,t+1}$ is the household's consumption level at t+1 and z is the poverty line.

Only cross-section data are available. To derive a consumption prediction model, this is considered in general as:

$$c_{ht}=c(X_h, I_h, \beta_t, \alpha_h, \varepsilon_{ht}) \qquad (2)$$

where X_h is a vector of observable household characteristics, I_h is a vector of observable risk management instruments, β_t is a vector of parameters describing the state of the economy at time t, α_h are unobserved but fixed household characteristics and ε_{ht} are stochastic errors. To derive the vulnerability measure at the household level, substituting (2) in (1) gives:

$$v_{ht}=Pr(c_{h,t+1} = c\left(X_h, I_h, \beta_{t+1}, \alpha_h, \varepsilon_{ht+1}\right) \leq z \mid X_h, I_h, \beta_t, \alpha_h, \varepsilon_{ht}) \qquad (3)$$

in words, the estimated probability of being poor using the prediction model (1), based on information available in period 1, but including (possibly predicted) information about β_{t+1} and ε_{ht+1}.

The crucial elements in this specification are β_{t+1} and ε_{ht+1}. Both variables are indexed by t and therefore include information about the evolving state of the aggregate economy (constant across households) and aggregate shocks. Typically, and in Chaudhuri et al. (2001), there is no information on β_{t+1} within the data and so ignored while similarly, no time dependence of errors and shocks ε_{ht+1} is allowed for. In short, the risk and the vulnerability to poverty considered are only idiosyncratic – i.e. no aggregate shocks are allowed for.

This implies (2) and the model is further linearised, although allowing for heteroscedasticity determined by X_h (dropping any distinction with I_h). Technically,

$$\ln c_h=X_h\alpha + e_h \text{ with } e_h \sim N(0, X_h\theta) \qquad (4)$$

[32] It could be argued (and is by Chaudhuri et al. (2001)) that whether these problems outweigh the benefits from the approach is an empirical matter. The jury is still out on that point.

in which α and θ are coefficient to be estimated. This model is estimated using Feasible Generalised Least Squares.

Using a useful characteristic of this linear model and from the normality assumption of the errors, and defining Φ as the standard normal distribution, household vulnerability is estimated as:

$$\hat{v}_h = \hat{Pr}(\ln c_h < \ln z \mid X_h) = \Phi\left(\frac{\ln z - X_h \hat{\beta}}{\sqrt{X_h \hat{\theta}}}\right) \quad (5)$$

Highly vulnerable households are then households with a predicted probability of more than 50 percent to be poor. Any household with probability to be poor above the current poverty rate of 22 percent is said to be vulnerable. Results of this exercise using cross-section data from Indonesia are in table 8.

Source: based on Chaudhuri et al. (2001), Holzmann (2001).

- *One possible improvement is to estimate the shock distributions based on data for changes in outcomes, using panel data. The data on outcome changes implicitly include the response to actual shocks faced by individuals. This approach makes sure that shock distributions do not have to come from extrapolating cross-sectional error processes. Other work has shown that one can relax the assumptions regarding the distribution of outcome shocks faced by individuals by using non-pa rametric models.*

Some authors have attempted improvements in the restrictive nature of relying on a cross-section data set to obtain forward-looking information on shocks possibly faced by households. They use panel-data (i.e. data on the same households over time) which have the advantage that changes in outcome levels are bound to include actual information about shocks experienced by households. Pritchett et al. (2000) uses this to estimate the standard deviation of consumption *changes* using panel data from Indonesia, which could then be used in a quite similar framework as above. It is worth mentioning also Christiaensen and Boisvert (2000) who appear to use a similar framework, but now applied to calorie-intake and the risks of seasonal hunger in Mali. Table 10 describes the approach and the results.

Table 10 Food Intake and Vulnerability in Mali 1997-98 (percentages)

Christiaensen and Boisvert (2000) used panel data on a small sample from Northern Mali to construct a prediction model of food intake in the hunger season based on information from the post-harvest period. They used characteristics of households in the post-harvest period to predict the mean and the variance, assuming multiplicative heteroscedasticity. Then, as explained in table 9, they predict the probability that the household would have food intake below 2345 Kcal per capita. The consider vulnerability as a probability above 50 percent, low or no vulnerability as anything from 50 percent to zero percent.

Predictive power of vulnerability measure: vulnerability and future poverty

	In hungry season t+1		
	Not under-nourished	Under-nourished	Total
No or low vulnerability at post harvest period t	17	7	24
High vulnerability at post harvest period t	25	51	76
Total	41	59	100

Current poverty and vulnerability

	In post-harvest period t		
	Not under-nourished	Under-nourished	Total
No or low vulnerability at post harvest period t	20	5	25
High vulnerability at post harvest period t	43	32	75
Total	63	37	100

The results indicate first the large increase in undernourishment between the post-harvest period and the hungry season (from 37 to 59 percent). Three quarters were judged to be vulnerable when seen from the first period, although only two-thirds of these turned out to be undernourished ex-post. Most of these hungry in the second period could be predicted to be so in the first period (51 out of 59). As Christiaensen and Boisvert (2000) argue, this shows the empirical validity of the measures. They also discuss some correlates with vulnerability. It is worth mentioning that they find that formal education does not reduce the household's vulnerability to hunger in this setting.

Kamanou and Morduch (2001) improve on the restrictions of using specific distributions of errors. considerably in work on two-year panel data in Côte d'Ivoire. He considers consumption changes as the basic regression and does not rely on parametric assumptions regarding the normality of the error term (compare with (4)). In short, he does not need to assume that shocks come as if drawn from some normal distribution to generate *distributions* of outcomes to base vulnerability measurement on[33]. Still, the fact that all the information on risk comes from the error processes in the data remains a problem.

- *The current focus has been on a vulnerability head count, i.e. counting individuals that have a probability at least equal to some level to fall into poverty in one or another dimension. Furthermore, the focus has largely been on consumption poverty. However, there is no need to restrict measurement to these dimensions, while measures of vulnerability based on poverty depth or severity of poverty are also possible. The methodological ideas remain the same.*

[33] He first predicts errors for each household based on a prediction model of consumption changes, based otherwise on information from the first year of his panel, to get a forward looking model based on information at a particular point in time. This gives a non-parametric distribution of shocks. He then randomly reallocates these errors 1000 times across households ordered by groups (monte-carlo simulations, using 1000 states of the world). For each household this results in a distribution of future outcomes consisting of 1000 values.

Another criticism of this approach, already highlighted by the fictional example on nutrition, is that the focus is only on a probability of becoming poor, effectively a definition of vulnerability related to the head count only. The head count (whether related to consumption poverty or child malnutrition) is problematic since it ignores any information on the depth of poverty. Clearly, it would be helpful to extend the approach (Alwang et al., (2001), p.22). This is not an impossible problem to solve. For example, one could consider a measure of vulnerability based on other standard measures such as the poverty gap or the squared poverty gap[34] . The starting point is to calculate this index for each state of the world. Expected poverty can be calculated across states as well as the *distribution* of these poverty measures for different groups[35]. The more likely high poverty (as measured by the gap) is, the more vulnerable. Similarly as before, highly vulnerable groups could be defined as those with particular high probability (e.g. 50 percent) to reach at least a particular level of the poverty gap. Or one could consider characteristics of the distribution for each group, since each level of poverty has a probability attached to it. For example, at the lower end of their distribution, one can define for each group a specific level of the poverty measure, below which households of a group have a 50 percent probability to fall. The lower this level, the higher the group's vulnerability, allowing one to group high, low and non-vulnerable households[36]. In short, just as different (multidimensional) indicators of poverty can be addressed by a quantitative approach to vulnerability, different ways of aggregating, not just limited to counting the vulnerable or the poor are also possible to incorporate.

- *One can also go a step further, if information on risk faced is available. The dubious assumptions about statistical error processes can be replaced by explicitly modelling shocks and the ability to cope in a prediction model.*

Can one incorporate information on shocks and on the ability to cope into this framework? As argued above, the restriction to basing all information on risk and its implications for outcomes on error processes from within statistical models is not satisfactory. Amin et al. (2000) and Dercon and Krishnan (2000) show that this is not necessary. They do not rely on predicting outcome distributions based on unobserved error processes, but explicitly use data on shocks (including illness, crop failure and rainfall) in papers respectively on Bangladesh and on Ethiopia. This allows one to consider the ability to cope with risk directly in a forecasting model. Table 11 gives details of their approach. Effectively, they use panel data to form a prediction model of how different common and idiosyncratic shocks (and even seasonal fluctuations) affect consumption outcomes. In principle, it is possible to allow for the differential ability of different groups to cope with risk, via

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[34] These poverty measures are defined as $P_\alpha = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z-y_i}{y_i}\right)^\alpha$ with α=0,1 or 2 for head count, poverty gap and squared poverty gap, and N is the population size, q is the number of poor, z is the poverty line and y is consumption.

[35] Table 5 effectively presents such distributions for the z-score and table 6 for the 'individual head count' of child malnutrition. The line with 'average z-score' and 'average percentage wasting' describe overall distributions, with the expected value reported as well. It is self-evident that some deviation or squared deviation from –2 can be easily constructed from table 5, to result in the type distributions suggested above to construct vulnerability measures from.

[36] Kamanou and Morduch (2001) construct distributions of the squared poverty gap along these lines for Côte d'Ivoire, even though he does not interpret the result in the context suggested above. Rather, he uses it to consider predicted transition probabilities over time.

interaction effects or simply estimating group specific models on the data. Amin et al. (2000) use the former strategy.

Table 11 Linking shocks to outcomes

Amin et al. (2000) and Dercon and Krishnan (2000) consider a forecasting model of the following structure:

$$\Delta c_{ht} = \beta_h \Delta I_{ht} + \gamma_h \Delta C_{ht} + \lambda_h \Delta S_{ht} + e_{ht} \quad (6)$$

in which idiosyncratic shocks are denoted by ΔI are idiosyncratic shocks, ΔC are common (aggregate) shocks and ΔS are seasonal factors. Coefficients have subscript h to signify that different households may have different possibilities to respond to shocks and fluctuations, so that they have a different impact on outcomes.

The idea is that households have some 'permanent' (time-invariant) underlying level of consumption and actual outcomes are the result of shocks and fluctuations and their ability to cope with these shocks. By using a difference model, they do not need to consider this 'permanent' level. Since their data involves only relatively short panel, they do not (cannot) consider trends or shocks that cause permanent effects. Dercon and Krishnan (2000), in an application to Ethiopia, use data on idiosyncratic shocks (such as crop damage due to pests, illness and others) as well common shocks (rainfall, common per community in their data). They also include measures of seasonality (labour requirements linked to crop cycles, food prices). The result is that can predict consumption levels under different 'state of the worlds' using actual shock data, for example what the effect would be of a drought or serious illness in the household on consumption levels. They use this model to predict one counterfactual, a situation with bad individual shocks combined with rainfall of only 50 percent of the mean level. They find that in this scenario, the poverty rate would be about 40 to 70 percent higher than the observed poverty rate. Also, they find considerable predictable fluctuations in poverty due to seasonal factors.

Dercon and Krishnan (2000) do not allow for household- or group specific coefficients, partly because they did not immediately find different reactions for different groups in their sample of rural smallholders. Amin et al. (2000) address this problem, although they restrict their focus to idiosyncratic shocks only (by reducing ΔC to a village fixed effect). They also do not have directly measured shock information, so they use income change predictions as measures of shocks. They interpret the group-specific coefficient on idiosyncratic shocks as a measure of vulnerability – although more correctly it should be seen as a differential ability to cope with idiosyncratic shocks (Kamanou and Morduch (2001)).

- *By using survey data on shocks faced, combined with historical sources on large or common shocks such rainfall, price shocks etc., it would be possible to derive measures of vulnerability allowing for more realistic risk models and differential risk-coping ability on the part of households.*

Both papers use this model to derive results on certain dimensions of vulnerability, even though they do not use it to construct measures as described above. The important point is that if one were to link their approach with detailed information on shocks (including their covariances), one could derive much more convincing distributions of outcomes in the population under different states of the world. To construct these shock distributions, it is preferable to have 'shock' variables included in the data collection procedure to start with, so that links between risk outcomes, for both idiosyncratic and common shocks, and the data can be explored directly, as in Dercon and Krishnan (2000). In table 12, I describe how this could lead to vulnerability measurement in the case of the Ethiopian villages in their sample. In general, the data on shocks can form the basis for distributions of idiosyncratic shocks, for example per group – possibly in combination with some of the

approaches suggested above, e.g. as in Kamanou and Morduch (2001). Information on large and common shocks could come from historical data, and if necessary, some judgement of possibly 'new' large shocks in the future. Combining these different distributions, and allowing for covariances, it is possible to construct a distribution of different 'states of the world', combinations of risk outcomes combined with probabilities. Since the prediction model makes the link between risk and ability to cope, this would lead to a full outcome distribution in each state of the world. Then, measures of vulnerability based on the head count or other poverty measures would then be easily derived as before.

Table 12 Using panel data and shock information to inform vulnerability

This application uses data on 15 villages and 1450 households from across the country, selected to represent the diversity of rural Ethiopia. Panel data covering three rounds collected in 1994 and 1995 are used. The first step is to estimate the model as in (6) and in Dercon and Krishnan (2000), but allowing for group-specific ability to cope with shocks[37]. This becomes the prediction model linking the ability to cope with risk and fluctuations to outcomes in consumption.

The panel data themselves include quite a large number of particular idiosyncratic shocks (for example, risks of pests, illness, risks of labour shortage, hailstorm damage, failure to find nurse at health facility, etc.)[38]. Rainfall data were collected at the village level (or nearest rainfall station) from official records. Food price data came from own price surveys, but were triangulated with official records on prices collected by the Central Statistical Authority for the region. This information, including historical records on common rainfall shocks can form the basis for overall risk distributions.

In particular, the panel data can be used to construct (group specific) distributions of idiosyncratic shocks. The covariances of these different risks within groups can also be explored. Information on large shocks, including aggregate or catastrophic shocks cannot be retrieved from the data set, if only because panel data sets do not cover long enough periods to capture all possible large shocks. Historical rainfall and price data could be (carefully) used to construct distributions, possibly allowing for time dependence and covariances. Combining these different sources of shocks, and allowing for covariances, it is possible and feasible to construct a distribution of 'state of the worlds', combinations of possible shock variables for the whole population with an attached probability of occurring.

These risk distributions could then be fed into the prediction model to conduct a simulation for each state of the world for all households. The result would be a mapping from risk variables into household outcome variables, similar to table 5, but accounting for possibly differential ability to cope with risk. Vulnerability measures could then be derived using the head count or other aggregations of poverty.

It would finally be possible to decompose vulnerability to poverty into vulnerability to poverty due to risk, vulnerability to poverty due to permanent factors and vulnerability due to seasonality, allowing a fuller assessment of vulnerability.

Source: Dercon (2001, in progress)

[37] Another improvement compared to Dercon and Krishnan (2000) would be to allow for different effects for downside rainfall risk compared to exceptionally good rain. Dercon and Krishnan (2001) addresses this point.

[38] A problem in the specific case of the Ethiopian papel would be that the data may not be sufficiently representative for the country as a whole, even though this has been disputed. The example here is heuristic, not arguing the case for using this example for general policy in Ethiopia.

- *Panel data would be most helpful to model the impact of shocks on outcomes and therefore construct prediction models for vulnerability measurement. Cross-section approaches should however not be excluded: shocks and risk can also be fruitfully included to yield superior models to predict vulnerability.*

Note finally that the approach described is largely based on panel data to form a reliable prediction model. It is a fact that panel data are helpful in this respect: since they include actual, household-specific information on changes in outcomes over time, and since one can possibly include information on shocks experienced as well, it is possible to have direct measurement of the household's ability to respond to shocks, thereby also controlling for heterogeneity in the population. In a cross-section, by lack of a time dimension, the household's ability to cope with shocks needs to be addressed via further assumptions, effectively about the meaning of the error process in the regression and the issue of heterogeneity. Still, it should be possible to also include direct measurement of shocks, also in a cross-section framework. For example, information on illness, levels of rainfall or other shocks can be used in a cross-section regression and their impact on outcomes in the cross-section assessed – one does not need to only rely on statistical error processes to address this issue[39]. Consequently, it should be possible to use cross-section models in combination with shock data to get superior models to predict vulnerability.

4.3 Measuring vulnerability using assets, incomes and risk strategies

- *The data needed to construct outcome-based measures are very high, while they do not give much insight on how the poor cope with vulnerability. Other measures may help to fill these gaps.*

Despite some of the advantages of outcome-based measures, the data requirements remain high. Furthermore, even if the approach described in tables 10 and 11 is followed, much information useful for vulnerability-reducing policy, in particular on *how* households handle risk is missing. Alternative measures may be able to provide more insight on this, while they may be easier to collect and compile. This implies that it is definitely worthwhile to explore alternative routes. In this section, I will explore the possibility to use measures describing different constituting parts of the vulnerability framework described in section 3. While the economics, but also the health and nutrition literature have been largely exploring outcome-based measures, at least two strands of the literature have been exploring in detail some other parts of this framework, in relation to vulnerability. In particular, the sustainable livelihoods and related literature (building on sociology and anthropology) and the food security literature can provide inspiration (Davies (1996), Moser (1998), Moser and Holland (1997), Norton and Foster (2001), Maxwell (1996)).

[39]Identification of the effects on shocks will be superior in panel data models, since they can control for heterogeneity in the population (using fixed effects models). For example, in a cross-section, illness may occur more often in households with poor health endowments. Poor health endowments would reduce productivity, and therefore expected levels of income and consumption. In a panel model, by running fixed effects, the effect on the change of illness would control for the differences in health endowments. However, in a cross section regression, the coefficient on illness shocks would be more negative than the 'true' coefficient, since the missing health endowment variable will be negatively correlated with illness. What should have been an effect on mean levels of consumption now will be interpreted as a generally higher inability to cope with illness *shocks*. Vulnerability measurement and interpretation will be lead to inappropriate policy advice: health endowments should be strengthened and one should not necessarily increase illness insurance provision.

- *Sustainable livelihoods approaches have focused on assets. It may be worthwhile to use quantitative measures of different assets (including physical capital, human capital, commons, public goods and social capital) to proxy vulnerability.*

Using participatory and other contextual approaches, the sustainable livelihoods approach has provided much detail on individual, household and community vulnerability to future hardship. There is definitely a case to continue this type of work: from our point of view in order to continue to inform about changing perceptions of vulnerability and on the mechanisms used to cope with risk and vulnerability. A further question is the following: can one draw upon their experiences to derive *quantitative* measures of vulnerability and of the mechanisms used to cope with risk? In terms of determinants of vulnerability, assets in their various forms (including human capital, commons, social capital) are often focused on in particular (e.g. Moser and Holland (1997)[40]). This does not mean simply that just *measuring* assets would be considered as an appropriate *quantitative* substitute for this approach by all. For example, Narayan et al. (2000), describe the diversity of assets affecting vulnerability and argue that participatory efforts are needed if proper policies are to be formulated, while common metric approaches resulted in improper policies and misguided programs[41], although as a general statement, many would not agree.

- *Quantitative work has shown that access to assets are important determinants of poverty but also of the ability to cope with hardship.*

As a consequence, measuring the diversity of assets, in terms of ownership and access, may be a useful and illuminating exercise. In general, assets have been found in quantitative work to be crucial in explaining both activities and incomes, and as a consequence household outcomes[42]. Furthermore, there is substantial empirical evidence that access to assets, in particular liquid financial or physical assets (cash or e.g. livestock), as well as access to social capital (networks etc.) are important determinants of the ability to withstand the consequences of income shocks (for reviews see Morduch (1995), Dercon (1999)).

- *For physical and financial assets to be useful for protecting against vulnerability, they should have a reasonable return and limited risk. They also should be liquid and maintain their values during crises. These latter characteristics are not easily quantified but crucial for vulnerability.*

When measuring assets (and for the time being, let us consider first physical or financial assets), it is useful to distinguish carefully the characteristics of different assets. To be helpful in generating income, assets need to have a high return. To the extent that high

[40] "Vulnerability, therefore, is closely linked to asset ownership: the more assets people have, the less vulnerable they are; the greater the erosion of assets, the greater the level of insecurity." (Moser and Holland, (1997), p.17)

[41] I would argue that only misguided quantitative approaches that are improperly used lead to this situation (see also Alwang et al. (2001), p.12).

[42] While this may seem self-evident, this is not necessarily so from the point of view of economic theory. While total income will definitely be the sum of the earnings from each of the endowments owned, activities should not be determined by asset ownership when markets are perfect, i.e. when assets are perfectly tradeable, including over time. In particular, the fact that physical assets (land, financial capital) appear to determine access in a number of high-return activities, while educational opportunities are larger for the richer can then be interpreted as reflecting imperfect credit markets, that do not allow individuals to borrow against their future earnings from their labour.

return assets are often more risky, this implies that for the ability to cope with risk, there is typically a trade-off in the type of assets held (Alwang and Siegel (2000)). To use assets directly to generate cash in case of bad situations (i.e. selling assets), their liquidity is important, but also the extent to which asset values hold up in times of stress (Dercon (1999)). Liquidity implies that assets can be easily sold, in relatively small units. Maintaining asset values during crises effectively means that the covariance with other sources of risk, both at the individual level and at the community level, should be minimal.

Livestock, in many areas the favoured source of savings for (not so) rainy day, are a case in point. Cattle are typically a high return asset, but its liquidity undermined by the fact that one cow or oxen represents a substantial capital, often more than is needed to cope with the hardship faced. Small stock are better, but often do not generate high returns. The key problem is however related to covariate risks: when a crisis, say a drought, hits the area, all are selling their assets. Prices may collapse and the income and entitlement generated from selling the asset when needed is very low. Numerous regions witnessed such process during famines (De Waal (1989), Sen (1981)).

- *As a consequence, measures of asset values as proxies for vulnerability may have problems, unless these dimensions can be addressed.*

Assets may be a useful basis for protection against risk in principle, generating income and protection in many circumstances, but the real test is whether in particular situations of deep crisis it still provides this. As a consequence, simply measuring values of livestock (or assets in general) owned may be misleading as an indicator of vulnerability in general. For example, as part of a profile of vulnerability across different regions or groups, livestock values owned may provide a misleading sense of the true pattern of vulnerability across these regions or groups, if some face covariances in the prices of livestock with other sources of risk, while others do not have this problem[43]. In a way, this example shows that generalising findings from contextual studies implies problems, i.e. the effectiveness of assets in reducing vulnerability must be studied and understood within a particular context. However, the real task is to investigate whether one can finds ways of generalising about the effectiveness of assets, and this is largely an empirical issue[44]. Until then, one should use these measures with caution.

- *Also for other assets, including commons, public goods and human capital, the key point is whether they can withstand stress, so that they can be effectively mobilised during crises. There is some evidence related to human capital and the commons, but more work is needed.*

Other assets, such as access to commons or access to public goods, as well as human capital are again clearly linked to better average levels of well-being. But whether they necessarily are good indicators in reducing the risk or seasonal influences on poverty may be debated. If anything, the crucial point is the same: can it be mobilised when things go

[43] In fact, someone who typically faces a crisis exactly in the opposite period from the rest of her community may have much more protection from less assets than the rest of the community, if these covariances are relevant.

[44] I can therefore agree with Morduch (2001) that the link between assets and concepts of vulnerability needs to be tested before asset measures should be used as measures of vulnerability. This is definitely worth doing, rather than dismissing.

wrong? Again, for idiosyncratic shocks this may be possible, but during common shocks they may again be harder to draw on (if everybody does as well). For example, the study on rural Mali quoted above suggested that education was not helpful to withstand stress, although evidence exist that it is a crucial factor to get better off-farm opportunities during difficult times (Ellis (1998)). Similarly, the reliance on wild foods during famines or during local stress has been well documented – but measuring their availability to assess vulnerability is another matter.

- *Mutual support systems are definitely important, but access to these social networks during stress and crises is also no guarantee, even despite well identified ethnic or family links. The collapse of some of these systems during famines is well documented, but even for idiosyncratic shocks, evidence suggests that support is no certainty.*

Social capital, in the form of both relying on family networks for support as well as sustaining elements of trust to assist in enforcement in economic and other relations, would need to be looked from a similar point of view. In general, the evidence is growing that social capital of these forms is helpful in assisting growth in incomes and economic opportunities. But what if a crisis happens? Also, can everybody rely on falling back on it within seemingly homogenous communities?

On this, more work has been taking place, also by economists. Family and community support is known to come under stress in famine situations (Rahmato (1988), De Waal (1989)), making it less reliable during serious, covariate shocks. But even to cope with idiosyncratic shocks, the evidence is not necessarily as rosy as sometimes is suggested. Many are excluded from support, despite sharing ethnic or family links with others, mutual support networks tend to be more accessible to relatively better-off families while support, although possibly expected is often no forthcoming. Table 13 gives examples from extensive quantitative surveys in a village in Kagera, Tanzania and in a few villages in Northern Ghana (based on DeWeerdt (2001) and Goldstein et al. (2001)). In conclusion, social capital should be studied, but not in a simple idealising way, by suggesting that ethnic or family support networks are covering all in the same way. It also means that measuring social capital cannot be simply done in these limited dimensions only, but must focus on whether support can be sought and can be reliably offered. Furthermore, the type of shocks for which this support is available must be investigated.

Table 13 The limits to mutual support networks

De Weerdt (2001) studied a village in Kagera, Tanzania in detail using very extensive (quantitative, but highly contextual) survey instruments. He asked all the adults in the village to nominate all the other adults in the village they could fall back on or were willing to support if something happened. He then investigated in detail the socio-economic and social links between the individuals nominated. Common characteristics such as clan, kinship and neighbourhood were important to explain links – consistent with the views of close networks, constituting strong social capital, providing mutual insurance. But another strong explanatory factor was wealth: the wealthy were happily supporting each other, but links with poorer people were more limited. In fact, the poor simply had fewer persons to fall back on, leaving them more exposed. Goldstein et al. (2001), in Northern Ghana, did not investigate the hypothetical linkages, but looked back at idiosyncratic shocks and asked whether individuals needed help for them. If so, they investigated whether help was received and who did not receive it. Again, a surprisingly large number of individuals did not get support (often not even from their spouse).

- *Assets in general are therefore likely to assist the ability to cope. Measurement of the different form should be encouraged. But much attention will have to be paid on whether they can actually be mobilised when idiosyncratic or common shocks occur – otherwise their role as a determinant and proxy for vulnerability would be misjudged.*

The conclusion on asset based measures is then quite clear. Assets are bound to inform the ability to cope and therefore vulnerability. They could be measured – much progress has been made in recent years to capture them. At the same time, the focus has to be not simply on whether the various forms of assets are there and whether typically individuals and households have access to them. While this is bound to inform levels and trends of well-being, for vulnerability measurement their usefulness during times of stress is more important. Furthermore, one will have to distinguish their role when different shocks hit. For example, one would need to distinguish situation when shocks are individual-specific and when there are common shocks, since in the latter case, covariances may seriously undermine their usefulness.

- *Social safety nets themselves should also be the object of study and should be included in any attempt to measure vulnerability and its determinants. Their presence and the targeting of actual support to the poor is usually seen as sufficient indicators of their effectiveness. From the point of vulnerability, this is insufficient: it needs to be known whether they effectively reduce the impact of shocks on individuals, while the risks of exclusion should be assessed as well.*

Finally, one should also add that one important asset of the poor, access to a public safety net, will definitely have to be an important object of study, possibly with measurement of the entitlement and the risks of exclusion. Different forms of safety nets, from food aid, food-for-work to social funds, have been widely studied. Any study of vulnerability must try to assess the protection offered by these safety nets. Most of the studies have however focused on assessing their role in terms of reaching the poor, and the support for current living conditions they provide. Some attention has also been given to whether they help to build the productive asset base. At least in the field of food aid and broadly other food assistance programmes, it is hard to find evidence on whether the programmes actually reduce the impact of shocks or strengthen the ability of households to cope with these shocks, and so reduce future vulnerability (Barrett (1999) in a large chapter for the Handbook of Agricultural Economics on food assistance programmes finds zero studies). This is an important gap. Furthermore, the ex-ante probabilities of obtaining food aid and their ex-post realisation are crucial as well from the . If, ex-ante, there is no certainty that households with specific characteristics will definitely receive assistance ex-post, but only a certain fraction of the needy will receive it, then the contribution to the reduction of *vulnerability* by the safety net is relatively limited, since all households with these specific characteristics will risk exclusion from the safety net. These risks of exclusion are rarely examined, by they are inherent to any system where support is rationed relative to need (so that no all can be covered) and/or where targeting can only ever occur via imperfect information (so that needy were inadvertently excluded).

- *Income and crop diversification are often considered as a sign of reduced vulnerability. While they can contribute to reducing income risk, in practice, they tend to be poor proxies, since the motivation and costs to enter into different activities*

varies substantially. Activity based measures using information on specific risk-related activities may be more fruitful.

Others (e.g. in the food security literature but also elsewhere, e.g. Ellis (1998)) have focused on the role of diversification in reducing risk and vulnerability. The idea is simple: combining income sources with independent or at least not totally covariate risk will always reduce the overall risk in income faced by individuals (Dercon (1999)). Indeed, some implicitly seem to use it as an index of vulnerability (Reardon et al. (1987)). Income diversification or crop diversification can then become a sign of security and even promoted as part of a vulnerability reducing or famine prevention policy. In practice, the evidence of a link between diversification and security is not as strong as hoped for.

Part of the reason is that many different strategies are lumped together, implying that their meaning is lost. Observed diversification includes: growing different crops, combining farm work with off-farm business or wage labour, combining petty trade with small informal sector production activities, collecting firewood and dungcakes, etc. For example, off-farm activities are typically desirable because of high return, but face they are hard to enter: entry constraints in the form of capital or education are usual, so only less poor and less vulnerable can do them. Other activities may also desirable because of their high return, but are highly risky, so only the less poor and less vulnerable are willing to do them (eg HYV,..). Finally, certain low entry activities have very low returns but low risk – desirable for vulnerable not desirable for non-vulnerable (eg dungcakes, firewood)… Surely, lumping them together in one index would miss the point.

In practice, research has found that diversification for effective risk-reduction appears hindered by entry constraints: they require capital or skills, which the poor often do not have. They remain excluded from the most profitable diversification possibilities. Note also that the observed diversification is 'endogenous': those with low risk activities seem less vulnerable but do them because they are vulnerable; those with high risk activities seem more vulnerable but do them because they are not very vulnerable,… In conclusion, there are serious problems with using this type of information. Looking for specific types of activities (low risk, low return) to identify those trapped because of vulnerability is maybe more useful. Collecting more information on the risks and entry constraints involved in different activities would also be helpful.

- *Some other 'vulnerability' measures, used in early warning systems via vulnerability maps may be useful, but typically are vague about the meaning of vulnerability and risk, assets, ability to cope and outcomes are not easily distinguished.*

The food security literature is also abound with another strand of vulnerability work (apparently often sponsored by USAID and FEWS). The idea is to construct vulnerability indicators and then putting them on geographic maps. The basis for the vulnerability indicators in always very clear. Usually, they are an index of diverse indicators, including production, weather maps, information from past surveys, etc. Cluster analysis or similar techniques are used to construct indexes. The problem with this type of analysis is that inputs, outcomes, risk and responses are all lumped together, so for forming forward-looking indicators, this is not a clear or transparent way. Indeed, for some, these are just current poverty maps.

- *Specific microstudies in the food security literature have used forward-looking vulnerability measures as considered in this paper and linked them with alternative simple measures, such as related to eating less during crises and typical dietary diversity. These are definitely dimensions to explore further.*

Others within the food security literature are closer to the spirit of this paper and investigated whether 'food insecurity' could be proxied by simple measures that could be easily collected. Maxwell (1996) and Maxwell et al. (1999) have investigated the link between current nutrition and some measures of coping strategies, related to the reductions in meals and food quantities observed during periods of stress. Their focus was typically on the current nutritional status. For vulnerability, forward looking work is more appropriate.

Christiaensen et al. (2000), make a comparison between on the one hand a (seasonal) vulnerability indicator as described above (see table 10) with three alternative food security indicators that can be found in the literature, inspired by different disciplines: first, current (household level) food production, secondly, an index of dietary diversity and thirdly, an index of coping strategies. Table 14 gives details. They find that there is a fairly good predictive power when using food production levels and the coping strategy index, while dietary diversity is not a good prediction. Note that the horizon is relatively short (one season ahead), the setting very specific (one area in Northern Mali) and their vulnerability measure is not without problems; still these types of relations are definitely worth exploring further[45].

[45] Maxwell, D. (1996, 1999) explored different simple indicators but in relation to current food intake, not related to vulnerability to future food intake deficiencies.

Table 14

The question is to find simple predictors for seasonal vulnerability to malnourishment in Northern Mali. A forward-looking food intake vulnerability measure (see table 10) was compared with three alternative food security indexes.

- The first, an index of total food production in the most recent season, often used as a leading indicator for food insecurity in Mali, including by the government and FEWS, the famine early warning system.
- The second measure was dietary diversity, based on a food variety score, counting the number of items eaten over a registration period (Hatloy et al. (1998)). Two measures were used: a simple sum and a frequency-of-consumption weighted sum of food items.
- Thirdly, a coping strategies index was used, building on Maxwell (1996). The most knowledgeable woman within the household was asked questions regarding the frequencies over the past seven days of: going without eating all day, skipping meals during the day, serving smaller portions to different household members, and serving less preferred foods. Two measures are reported, one a simple sum and the other one using assigning weights to particular strategies (e.g. higher weights to going without food) and weighing the strategies based on the frequency of application.

The correlation with vulnerability to future intake shortfalls was investigated using different statistical methods. The findings suggest that food production is a good predictor of seasonal vulnerability. Dietary diversity is an ambiguous indicator, with insignificant correlations. Finally, the coping strategies index was closely correlated with ex-ante vulnerability, suggesting that it is a useful measure.

Note that they compare these indexes with their own, specific benchmark (their vulnerability measure), which is only a predictor itself whose predictive power for vulnerability are not easily assessed (since vulnerability per definition does not mean that the bad state will ex-post occur). Source:Christiaensen et al. (2001).

4.4 Data requirements for quantitative studies

- *A lot of information is needed to establish patterns of vulnerability across space and time, and much of this information is missing in current standard survey instruments.*

To make progress on measuring, describing and analysing vulnerability, the following information is in principle useful, preferably on representative samples of the population.

- Information on risks faced
- Information on assets
- Information on ability to cope
- Information on strategies used to cope
- Information on risk and quality of public policy
- Information on outcomes

Clearly, this is a lot to ask for, especially since at present few if any of this information is available from surveys. Outcome data is usually collected, not just on consumption or income but often also on education and health. Some assets tend to be included in current survey work, but the added dimension referred to above – that what matters is whether they can be mobilised in times of stress – can usually not be easily measured without more information or strong assumptions. Furthermore, while knowledge on how people cope

and their strategies is increasing, often this does not come from the larger representative surveys, but from much smaller, specific sample surveys. This means that this is a large data agenda and unlikely to be satisfied in the short run. Nevertheless, it would be useful to start this process soon, to help to get started with a data-based policy making on vulnerability.

- *Participatory poverty research and livelihoods analysis tends to cover many of these issues, even though the rich, contextual detail comes at a cost of doubts (rightly or wrongly) about generality and representativeness. Efforts to integrate this continuing research effort into quantitative work and sampling frames could have high returns in terms of impact and should be encouraged.*

Another point is that other traditions, notably livelihoods analysis, has arguably been covering many of the points above and also has become in many countries, part and parcel of general efforts to provide policy relevant inputs on poverty issues. Their work, with their rich descriptions of perceptions, experiences and problems of survival, can usefully to feed into our own concepts and perceptions on vulnerability. However, there is a further role for this information. Some quantification of this type of information should be explored. But even more importantly, it has long been a problem from the point of view of those trying to establish data-based policy that the lack of representativeness comes at a cost, including the possibility to ignore even valid findings. Furthermore, avenues to inform and debate contradictory findings remain closed (Canberra (2001)).

Moser (2001) argues that, with effort, it is possible for research using participatory approaches to be quantified and to make it representative. This would involve careful choice of communities and efforts in post-coding of answers in patterns. One could go a step further: ideally, this information should be directly linked to household survey data, at least via selecting communities from the same sampling frame[46]. In any case, a further triangulation and increased quality of data could be obtained. Also, such linked studies could become natural experiments to identify and analyse different dimensions of vulnerability, and even to construct reasonable measures of vulnerability.

- *Current surveys give insights on current outcomes and its correlates and only limited information about shocks and dynamics. Integrating quantifiable information about shocks, responses and consequences is not difficult and would yield new insights relevant for policy design and evaluation.*

This does not mean that one should ignore the possibility to implement large scale surveys with specific modules related to vulnerability, beyond the standard work. Mostly, surveys have focused on measuring current outcomes, asset owned, activities, demographics, health and education – in short, the type of survey that generates poverty measures, profiles and correlates of poverty. LSMS and different offshoots, and the current smaller welfare monitoring surveys all fall into this category. Obviously, these variables remain to be an important source of information on poverty, not least on the 'permanently' poor. The most important gap is information about shocks[47]. Getting a better understanding of

[46]Note that sampling frames are typically designed to implement two-stage or multiple-stage sampling. Effectively, first clusters – often communities – are selected and then a number of households from these communities are selected. By using the clusters as a frame to 'draw' communities for participatory work, a much closer link should be possible.

[47] This seems to be widely acknowledged as a priority, see World Bank (2001a) for Africa, Alwang et al. (2001).

the types of shocks faced by individuals, households and groups are most vulnerable too, and trying to make profiles of these risks at the local, regional or national level, as well as by social groups, is crucial in designing more inclusive vulnerability-reducing policies. Many documents contain lists of possible events. Few studies carry actual data on their frequency, magnitude and covariances across households. Nevertheless, they are not very difficult to gather.

- *Measuring shocks within household surveys can be done using relatively simple but carefully piloted modules. Examples include detailed information about shocks in current periods or large, catastrophic shocks over longer periods and covariate risk processes.*

First, simple modules can capture much information on shocks, how regular they are and on the covariances involved. Table 15 and 16 give tables compiled from data collected in 15 communities in Ethiopia. In annex 2, I give the modules from the questionnaire used to collect this information. Table 15 is simply based on direct questions of whether individuals were affected by particular events, where the type of questions were inspired by pilot work involving talking to many farmers in different areas close to the survey sites. The (essentially categorical) data describing the nature of the problems faced were aggregated in a number relatively simple indexes per household. The table below reports the average in the sample, which can be interpreted as an overall measure of occurrence of this 'problem'. The last column is a measure of average covariance in the village – the higher, the more likely the problem affects different households at the same time. This information was used in Dercon and Krishnan (2001) to model the link between shocks and outcomes, but could also form the basis for measuring vulnerability (as described in table 12). A few findings are interesting in this respect. First, for an individual farmer, rainfall as a cause of problems with crop agriculture, contains a substantial idiosyncratic element (i.e. the measure of the common part the variance is below 100 percent), depending on their crops and subtle differences in practices. Secondly, certain problems are more important than other – e.g. not finding oxen at the right time is more common than loss of harvest due to lack of labour.

Table 15 Shocks affecting income 1994-1995 in Ethiopia (n=1450, 15 communities)

	1994a	1994b	1995	village level variance as % total variance*
rain index (individual, 1 is best)$	0.57	0.57	0.63	77.0
non-rain shock index (1 is best), total index$	0.65	n.a.	0.80	24.2
non-rain shock : low temperature, frost, storm, etc.$	0.71	n.a.	0.82	35.4
non-rain shock: pests and diseases on crops$	0.59	n.a.	0.77	26.4
non-rain shock: animal damage, trampling,…$	0.68	n.a.	0.85	29.1
non-rain shock: weed damage$	0.29	n.a.	0.14	13.1
crop index (best=1, 0 worst)$	0.33	0.65	0.43	35.1
Livestock affected by animal disease (1 is best)$	0.72	0.86	0.89	21.1
Livestock affected by lack of water and grazing land (1 is best)$	0.71	0.78	0.78	22.3
Number of days lost by adults in last month per adult	0.66	0.45	0.39	3.1
Adults died in last six months	n.a.	0.04	0.02	4.1
Lower harvest linked to not having labour due to illness	0.19	n.a.	0.13	14.6
Lower harvest due to not finding labour when needed	0.18	n.a.	0.13	13.8
Lower harvest due to not finding oxen at right time	0.40	n.a.	0.27	29.6

$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.
**Figure for consumption refers to the variance of the log of real consumption per adult.
n.a.=not available (mainly irrelevant due to seasonal patterns)
Source: Dercon and Krishnan (1999b).

Table 16 reports on serious, close to catastrophic shocks in Ethiopia. The questionnaire went over a long list of possible events and shocks that could cause serious hardship (see annex 2 for questionnaire module). The list was based on pilots using open-ended questions. It asked whether the event caused very serious hardship in the last 20 years and to nominate the years in which it occurred, where simple landmark dates were used to help dating during the interviews. The same sample as above was used. The data in table 16 are a compilation of far longer lists per household – ordering the responses in reporting categories. Interesting findings include the frequency in which harvest failure due to environmental factors is reported – by far the largest group quoted this reason, with the mode year the year of the famine, 1984. Illness and deaths, affecting labour in the household or shock to livestock holdings were also very common. But outcomes due to the individual-specific effects of 'policy' are also high – higher than e.g. war or banditry, despite years of civil war in this period. While rural policy was especially restrictive in this period in Ethiopia, the effect also measures the unpredictability of the impact of policy – with specific measures at the village level, in the form villagisation or taxation (often in the form of forced deliveries of grain) affecting people in unexpected and often arbitrary ways.

Table 16 Shocks faced by rural households in Ethiopia (data collected in 1994)

	Percentage of household reporting to have been affected, by type of event in the last 20 year.	Mode year of the most recent serious event
Harvest failure	78	1984
Policy problems	42	1985
Labour problems	40	1993
Oxen problems	39	1993
Other livestock	35	1984
Land problems	17	1989
Assets losses	16	1985
War	7	1989
Crime/banditry	3	1986

Source: based on data from the 1994-95 Ethiopian Rural Household Survey.
Definitions:
War: direct effects, such as abduction men and women, destruction market, destruction of crops and livestock, death or disability due to war.
Harvest failure: due to drought, flood, pests, storage losses, frost, etc.
Labour problems: illness or death household members, divorce, etc.
Land problems: land reform and nationalisation, loss of land due to disputes, transfers to family members, etc.
Asset losses: destruction of house (fire, etc.), theft, house loss due to villagisation, etc.
Oxen problems: disease, theft, drought related death and distress sales, etc.
Other livestock problems: disease, theft, drought related death and distress sales, etc.
Policy: villagisation, resettlement, ban on migration, ban on wage labour, AMC quotas, taxation and forced contribution, forced labour, etc.
Crime/Banditry: theft, killing, wounding, disability due to banditry or other crime.

Other methods to elicit information on shocks are possible and should be experimented with to build up our knowledge on the scale and patterns of risk and shocks. Secondary sources could also be useful, such as historical data on rainfall, food, livestock and other asset prices. Prices could also usefully inform us about seasonality. But as was argued before, risk sources should not be analysed in isolation, but covariances between different sources should be established as well.

- *More direct data collection on individual, household and community mechanisms to cope with shocks, including on their reliability in different types of crises is needed. Another focus should be work on vulnerability to seasonality and the mechanisms to cope with this problem – another dimension largely ignored by standard cross-section surveys.*

A better understanding is needed about the ability to cope in different contexts and over time, and the role play by different assets in this respect. Measuring assets – as often done in quantitative surveys – will be useful, expanding it to non-standard categories, including social capital and access to commons. As was argued before, one needs to get a better understanding of whether different assets can be relied on during different crises. A study of the actual responses to different shocks would be helpful – for example, identifying serious shocks over a specified period and examining how individuals coped – e.g. via selling assets, via transfers – can help in understanding the relative importance of different strategies in different contexts, including who can rely on whom and what[48]. Large shocks

[48] In economics, there is a very large literature examining the questions whether savings and assets are used and succeed in buffering consumption when shocks occur, as well as examining the extent to which mutual support networks contribute to coping with shocks. These studies have mainly been done in the context of rural village

should obviously be the focus – but not only common or covariate shocks but also large idiosyncratic shocks. The importance of seasonality and the mechanisms used to cope with this problem are also important and should be tackled in this work, especially since it is largely ignored in most cross-section survey work

- *Panel data are not essential to gain useful quantitative insights on these issues, but are crucial for increasing our quantitative understanding of shocks and their impact.*

Panel data should continue to be encouraged, if only for a continuing triangulation of findings on vulnerability, coping strategies and impacts based on cross-section surveys and other methods. Our own experience suggests that they do not need to be immensely costly and fail to be representative, as sometimes appears to be suggested (Alwang et al. (2001))[49]. Panel data can most convincingly model the ability to cope with shocks and start trying to disentangle the effects of long term poverty from the vulnerability to shocks[50]. They also give valuable information on the outcomes resulting from processes of risk and fluctuations, including an ability to disentangle the role of risk from more predictable factors such as seasonality.

- *Further work on informal and formal mechanisms for coping with risk is essential, inter alia with a focus on the enforcement of rights to support, the risk of exclusion and their changes over time.*

It is important to study further the informal, community mechanisms available: their functioning, their relative spatial differences and the changes over time. Simple questions such as whether individuals can fall back on others for different shocks, with some specification of the characteristics and links with these other people can provide already simple but useful baseline information, to be backed up further with in-depth studies (see annex 2). Special attention should go to indigenous rules, changes over time in them, their enforcement and the risks of exclusion inherent in the group relations.

But beyond attention to more traditional or informal mechanisms of coping with risk, there is a need to study the role and functioning of the public safety nets, to the extent that they exist. As was argued before, ex-ante evaluation of these systems – do they give a sense of security to households – are important. Sample surveys could elicit experiences with formal safety nets – who is included and excluded. Also, whether they reduced the impact of shocks is also usefully investigated. Further studies, including participatory, could be very illuminating on the perceptions of people regarding the support offered, including the risks of exclusion in the system.

- *Work on the uncertainties surrounding public service provision is also important.*

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economies using panel data (reviews are in Morduch (1995, 2000) and Dercon (1999, 2001). While these studies yield valuable information, the suggestion here is towards simpler methods using direct questions in cross-section surveys, building on these previous studies. The evidence collected would be suggestive and likely to be persuasive, although it may not be based on the same riguour as the academic studies based on panel data.

[49] Panel data require more careful administration to keep track of individuals, while for feasibility may need to be using somewhat larger clusters (to reduce tracing costs). The latter is a statistical problem that can be addressed by statistical means. They also need serious long-term donor commitment – a rare commodity in the aid world.

[50] See the last paragraph in section 4.2 and the footnote related to this paragraph.

Finally, this focus could be usefully extended to social service provision, in health and education. As was argued before, service provision is risky in the sense that there is uncertainty about whether the service will be available when needed at clear terms. Rationing, poor quality and staff incentives are determining factors in this problem. These are not just items to be studied from the point of view of the service provider (as is often done). The risks and experiences of being faced with poorly functioning services and the impact on people, including on their decisions to make use of these services are an important part of understanding vulnerability to poverty, especially beyond the income poverty dimension. Again, quantitative studies linked to qualitative, contextual work could be fruitful in this area.

5. Changes in vulnerability: policy and challenges

5.1 Policies for reducing vulnerability: a framework

- *Policies to reduce vulnerability will include standard poverty reduction policies, aimed at improving levels and trends in well-being, but will need to be supplemented with policies focusing on risk and on fluctuations in well-being, such as related to seasonality. These additional policies should address or compensate for imperfections in insurance and in consumer credit markets.*

From the framework described in section 3, different ways of influencing vulnerability to policy via policy can be identified. One obvious way of classifying these policies would be in relation to the different groups of the vulnerable that can be distinguished. As discussed in section 3.4, the vulnerable consist of four groups: the permanently poor, those becoming permanently poor in the future due to some trend evolution, those that are likely to become poor due to predictable events (such as seasonality) and those likely to become poor due to risk and shocks[51]. As a consequence, policies could be distinguished that attempt to influence the different groups (or parts) of overall vulnerability to poverty of the population.

A first set of policies would be focused on permanent poverty, or in general at average levels of well-being (i.e. including 'chronic' poverty). This implies policies focusing on the levels and trends of well-being. Arguably, most standard economic and social policy advice on poverty alleviation is focused on this problem, especially the current focus on increasing long-term growth and making this growth pro-poor. The other set of policies relevant for vulnerability reduction would have to focus on risk, fluctuations and its consequences – largely excluded from much of the debate, beyond the concern for 'short run safety nets'. Separated from the first set of polices, they are equivalent to insurance and consumer credit policies[52]. In other words, they are needed because individuals are faced with imperfections and exclusion from these crucial markets. Of course, once more detailed policies are considered, the distinction between the first and the second set is

[51] Note that if one were to take into account a definition of vulnerability of poverty that not just counted the vulnerable, but also weigh their contribution to overall vulnerability poverty according to the depth or severity of their vulnerability to poverty (see the discussion in 4.2), then the same individual could contribute to different types of vulnerability defined by these four groups.

[52] Credit-for-productive-investment policies would be related to the first group. If one accepts that the lack of assets are the key to explain long-term poverty, then endowment inequality combined with credit market imperfections, excluding some to borrow against future earnings, are the problems that need to be addressed by policies to reduce poverty. See Banerjee (2001) for a convincing discussion of the underlying problems of poverty and vulnerability reducing policies.

blurred. But note that the seasonality aspect has not been covered by the first set of policies, and despite its partly predictable nature, a policy to address fluctuations in markets and entitlements remains important.

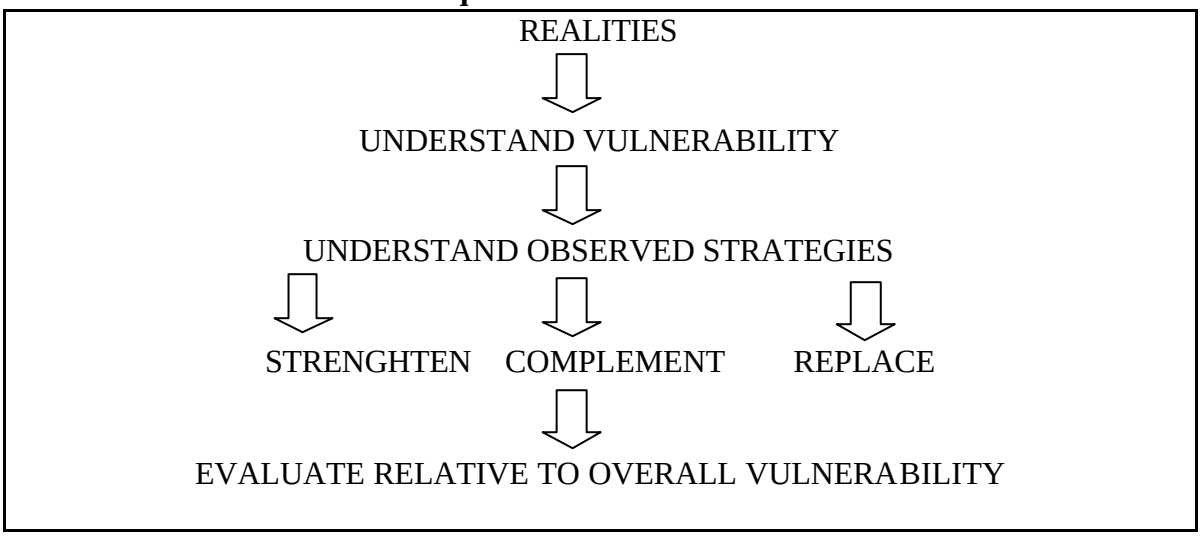
- *The World Development Report 2000/01 acknowledges that vulnerability reducing policies should be more than safety net policies, but start from the observed strategies used by individuals, households and communities.*

The World Development Report 2000/01 (based on Holzmann and Jorgensen (2001) linked a framework for classifying and understanding household and individual strategies to a framework of policies (see the discussion in section 3.2 and table 4). The framework is very helpful, since it points to the fact that policies are not just needed to allow households to survive the consequences of poor outcomes ('safety nets') but try to reduce their vulnerability ex-ante. They distinguish risk management, mitigation and coping policies, linking to different stages and strategies observed to be used by households (see table 4). While this is not the place to go into detail about the policies concerned, for our purposes it is useful to complement this framework with an added emphasis on the impact of policies.

- *Optimal policy design should aim to strengthen, complement and replace existing strategies to obtain maximal reduction in vulnerability. Replacement of traditional mechanisms is not necessarily problematic, although more needs to be known about the extent to which, how these changes are occurring and their net impact.*

Table 17 gives the steps involved in optimal policy design. Starting from the realities of individuals, households and communities, vulnerability and the observed strategies need to be understood. Optimal policy should then choose to find the optimal balance between policies that strengthen existing strategies used (e.g. reducing price or health risks, providing better information about opportunities), strategies that complement (e.g. offering better asset and savings instruments) or strategies that replace informal mechanisms (e.g. provide health or funeral insurance that effectively makes certain informal sources irrelevant or not cost effective for members, or provide old-age pensions making intergenerational transfers not necessary). The replacement of informal mechanisms is rarely a stated policy objective, but the findings on 'crowding out' suggest that it may be quite relevant (a short review is in Dercon (1999)). In any case, the evaluation of policies should be in relation to the net effects on overall vulnerability, including taking into account any replacement that may occur.

Table 17 Policies and its consequences



Most focus has been on formal transfers replacing informal transfers within families (usually between generations), often in middle-income countries (e.g Jensen (1999), Cox and Jimenez (1994)). The main finding of these studies has been that the net effect of the public transfer is less than the sums paid out, because public transfers to the needy (or to others) are reduced following the allocation of public transfers to them[53]. This is not the place for a detailed discussion on whether formal mechanisms really replace informal mechanisms (for brief overview and a detailed investigation in the context of Mexico's Progresa program, see Albarran and Attanasio (2001)). Most evidence suggests that 'crowding-out' takes place, and its size should not be ignored. Given the imperfections in traditional mechanisms, this is likely to be a price worth paying. But this does not mean that one should not be aware of its impact on 'traditional' systems. Furthermore, *how* 'crowding out' and the destruction of traditional mutual support systems may occur is rarely investigated. In section 5.3, we refer to some examples, emphasising how safety net policies may increase vulnerability for some.

5.2 Markets and vulnerability

- *Markets are means of linking people both spatially as over time. Shocks that otherwise would have afflicted only 'island' economies are now transmitted across a larger group of people.*

One of the most profound changes in the last few decennia across the developing world has been the general move to closer integration with the world economy, linked to growing liberalisation and market orientation of domestic and international economies. The East Asian crisis has seemingly provided evidence that this has resulted in increased vulnerability of large populations, even if the process may have improved average levels of economic well-being. Discussing this in detail is beyond the scope of this paper, but it is worth briefly exploring the idea of markets as a source of vulnerability. When considering risk, markets could be viewed as means of linking people spatially and

[53] Therefore the term 'crowding out' as often used in macroeconomics to describe public spending (investment) replacing private spending (investment), to reduce or nullify the net benefit.

possibly intertemporally. Prices and wages contain relevant information about these linkages.

- *Markets replace some 'natural' shocks by seemingly 'man-made' shocks. Trading risk in this way is profitable to all. Vulnerability should not increase, but shocks will now impact in different ways and on different people.*

When considering risk, it is useful to consider the differences with 'island' economies, meaning villages or areas that are closed off from the rest of the world, with no interlinkages. A simplified view of traditional economies would be consistent with this description. Such an economy would be liable to local shocks, such as weather and other climatic shocks, while any shock, related to price or quantities stemming from outside the island economy would have no effect. This does not mean that they are necessarily less vulnerable: while the island economy only has to cope with local shocks, at the same time it would have to bear the full brunt of the local shocks, without any ability to trade the risk with other communities and regions. For example, a local harvest failure would translate fully into local prices, affecting food entitlements for those not selling food. Markets would smooth these food price rises via imports, affecting those dependent for their entitlements on selling food. Market penetration also changes therefore those liable to risk and its impact. 'Globalisation' definitely involves replacing some 'natural' shocks by 'mad-made' shocks – while not per definition increasing vulnerability, but replacing shocks by others, affecting individual vulnerability to poverty – but not *a priori* increasing it[54]. In fact, trading of risks is welfare improving: an underlying reason for vulnerability is the lack of insurance and credit, while seasonality and the impact of risk is linked with poorly functioning product and asset markets.

5.3 Large economic shocks and vulnerability

- *The transmission process in integrated economies would mean that large economic shocks are passed on relatively fast, via relative price changes.*

It would, however, be incorrect to interpret the impact of 'common' shocks faced in poorly integrated economies (typically weather shocks) in the same way as 'common' shocks faced in more integrated economies. Commodity price shocks or exchange rates shocks are examples. The point about them is that in better integrated economies, these shocks are transmitted through the economy, opening the door for further negative externalities, especially if some markets are not working well. Collier (2001) has dealt with commodity price shocks and its effects on the macroeconomy. Let us briefly consider here financial crises, such as the East Asian crisis. An important characteristic is that exchange rate crises are likely to be first felt by those active in the modern or commercial economy – people who tend to be urban and relatively high income, and not by relatively low income farmers, many of them relatively more isolated from the market economy. Furthermore, the transmission of the shock is largely via relative price changes, transmitted relatively fast and efficiently via more developed markets. The result is also that much larger areas – countries but also across countries via contagion effects – are affected.

[54] Nevertheless, it sometimes appears that individuals find it less acceptable that people are exposed to market (man-made, imported) than to 'natural' (God-sent) shocks, even if the former comes with benefits of less exposure to some shocks.

- *The financial crisis in the late 1990s in East Asia and other parts of the developing world may suggest that vulnerability to such shocks had increased due to fast liberalisation, in the context of (too) weak financial institutions.*

Crucial questions for our purposes are, first, whether the risk for such large shocks has increased due to the process of world market and financial integration and secondly, who is now more vulnerably to poverty? On both questions, only a few points will be made, as it is still the basis for much research by many, probably more qualified researchers. Many would agree with Stiglitz and others that rapid financial liberalisation in economy in Latin America, East Asia and Russia in the late 1980s and 1990s increased the vulnerability of many economies to the crises one has witnessed. However, they typically argue that the weak financial and other institutions in these emerging economies are at least partly to blame for the size of the crisis, suggesting that it is not world economic integration *per se* but weak institutional development that was behind this increased vulnerability. The next steps are still subject of much research and debate.

- *Ex-post, it can be stated that despite high growth poverty reduction in East Asian countries such as Indonesia, vulnerability to poverty following large shocks had remained relatively high. The main effects appear to have been the long term reduction in health and education investments in children, in order to cope in the short run.*

The next question, about how this may have affected the size and composition of the vulnerable, can at least be answered retrospectively via an analysis of the effects of the East-Asian crises on different groups and outcomes. For Indonesia, a wealth of information, including much highly reliable quantitative data, based on data from the Indonesian Family Life Survey panel data, is emerging. Table 17 summarises some of the findings. Despite the fact that the crises first affected urban economies, it also filtered through to rural areas. A huge collapse in real earnings and incomes for some groups wiped out the equivalent of the real gains in wages of urban male employees of the last decade. The effects on current well-being, especially on income poverty were mitigated, partly because real earnings for males self-employed farmers kept up, and families managed to compensate loss of work of some members by entry into the labour market by others. Nevertheless, poverty rates, especially in rural areas, increased considerably from about 11 to 20 percent – although still well below levels of two decades or so ago[55].

The most serious impact in the long-run appears to be first, a reduction in enrolment, especially for poorer families and in rural areas, mainly in secondary education, and secondly, cuts in overall health expenditures by households and reduction in health visits towards lower quality alternatives, faced with much more expensive public and private health care. An important lesson appears to be that when such a large crisis hits, policy should in the first instance try to protect investments by families in health and education. From the point of view of households these are highly illiquid investments with a return that only comes much later in the future and so have little immediate benefit during a crisis. Avoiding price rises in public health care and providing incentives for children to stay in school would limit the impact of the crisis, and therefore reduce vulnerability to some dimensions of poverty significantly.

[55] The underlying data are not the same as those used for table 8, explaining the apparent slight discrepancy with these data.

Table 18 The impact of the financial crisis in Indonesia 1998

In a series of papers, Thomas, Frankenberg, Beegle and collaborators have analysed the impact of the financial crisis in 1998 in Indonesia on rural and urban households. Since little specific protection had been available for this type of crisis, the results can give one a broader sense of who had become more vulnerable to poverty in the years preceding the crisis. One should be reminded first of the fact that the decade (and longer) before the crisis had seen rapid economic growth, impressive poverty reduction, large improvements in health and education and rapid shift of employment from agriculture into higher paying manufacturing and services. For example, poverty had more than halved in only a decade while in the latest decade median hourly earnings had increased by more than 50 percent for men and close to doubled for women.

The financial crisis was initially an urban phenomenon, although the evidence showed that it spread through all sectors. The first estimates after the crisis had suggested that 2-5 million people would lose their jobs. Surveys show, however, that this was totally wrong: employment rates for men went down by less than 2 percent, while female employment even increased marginally. However, real wage earnings were found to have declined by about 40 percent, or offsetting most of the gains from the previous decade especially for men. They also found very high mobility in and out of work: many people lost jobs but many also entered the labour market and found jobs. Also, among those in self-employment, including farmers, the effects were not necessarily very negative. Many, especially males involved in farming, faced relatively stable real hourly earnings, making work in that sector suddenly again more attractive. In the urban sector, the self-employed lost similarly than wage workers; the same applies to rural workers and females in the agricultural sector.

The overall welfare effects of this are hard to disentangle. The worst effects were for those who lost work and did not find new jobs, or that had to work for much lower pay in their previous or a new job. Women entered in large numbers, taking advantage of new self-employment opportunities but also to mitigate the impact on family incomes – as has often been seen in other crises, their flexibility is a key to the mitigation of the crisis on family incomes. The surveys found that real household incomes are about half the magnitude of the declines in individual hourly earnings, suggesting more resilience to the crisis than sometimes suggested.

The evidence on poverty is highly sensitive to assumptions on how the 80 percent inflation rate in 1998 spread through the country. Some survey evidence suggests that rural inflation had been even higher than urban inflation. In that case, poverty rates were predicted to have increased from about 11 to 20 percent, with the highest impact in rural areas. Based on evidence on food spending relative to total resources, the largest impact of the crisis appears to have been on the (initially) poorest groups but also on educated groups.

The income poverty dimensions hide the fact that households moved away from less essential expenditure and investment to compensate for the real earnings losses. At the same time, households were faced with a price shock in health provision. These factors had a marked impact on health and education opportunities. Primary school enrolment rates, which had grown considerably in recent decades to near universal levels, did not drop very considerably, but still significant effects could be seen. For example, drop-outs in this age group increased from about 1 percent to 3.5 percent in 1998, while the total percentage not enrolled of the relevant age group changed by about 3 percent to about 6 percent, quite similar for girls and boys. The largest changes occurred however for the poorest 25 percent, where the increase was by 6 percent to 11 percent, and in rural areas, were this percentage increased to about 8 (plus 4.5 percent). Regarding secondary school enrolment for the 13-19 years, enrolment among the poorest quartile dropped, from about 59 percent to 43 percent. In rural areas, total secondary school (net) enrolment dropped from 61 to 51 percent. Further analysis showed that within poor families, the education of older children was generally protected.

Visits to modern health care also declined, and evidence suggests that resources have become a greater barrier to health care among the poorest during the crisis. Prices of both public and private care have increased, more so for public than for private. Especially for children, health care visits have decreased. Taking the evidence on health and education together, this implies that children, especially in poorer households, risk serious long-term loss of opportunities, via education and poorer health due to the crisis.

Source: Thomas et al. (2001), Frankenberg et al. (1999), Smith et al. (2000), Thomas et al. (2000)

5.4 Economic reform as a cause of vulnerability?

- *It is often ignored that economic reform often starts in the midst of deep economic crisis, when households and individuals have stretched resources in order to cope with this crisis.*

Vulnerability issues are often raised in relation to economic reform programmes as well. Much of this discussion is related to the reform itself and its impact on different groups. However, it tends to be easily overlooked that crises tends to predate reform: in virtually all countries implementing economic reforms, they follow as a belated response to major domestic economic and political crises[56]. The consequence is that in the period before the start of the reforms, income stagnation or declines have usually been accompanied with a depletion of productive assets, serious interruptions in health care or education, serious labour supply adjustments, such as drawing women into even more work at the cost of household and care activities, a breakdown in community level support systems and other social capital, etc. The implications for reform programmes are not well researched, even though the negative effects of the crisis are not easily reversed: even if reforms are encouraging income generation, the earlier losses are difficult to undo. For example, credit may be missing to re-acquire sold assets, or inflation may have wiped out its values; there are problems with catching-up in education or in child nutrition; it is the difficult to re-establish trust and social capital. The result is permanently lower resource levels, making responding to change even more difficult than the income declines may suggest. In Tanzania, rural asset depletion took place during the crisis in the first part of the 1980s. In Ethiopia, primary school enrolment dropped spectacularly in the late 1980s when conflict, economic crisis and drought interacted. Despite improvements in e.g. consumption and in enrolment, the 1990s saw persistent high stunting. The evidence quoted above for Indonesia also suggests permanent costs to the crisis. In short, the reform programme is likely to start in the context of rising vulnerability.

- *Economic reform is experienced by the vulnerable as a large unexpected shock or one they cannot easily respond to. This should be considered in its design.*

Economic reform then usually implies changes, perceived as unexpected shocks by poor households. Shocks involve large relative price changes, changes in labour demand, for example in public sector, shocks in returns to assets, such as physical assets, human capital and infrastructure, etc. Some of these shocks may well be perceived as unexpected

[56] In a major review of aid and reform in Africa, Devarajan et al. (1999) report this for the ten case studies. Economic collapse and in some cases, the end of war and civil strife, trigger the reform programme.

by poor households, or just as in the case of vulnerability to seasonality, households may be able to foresee part of the shock but are unable to respond accordingly. For example, current uses of assets and current activities are not likely to be the best for their long-term survival and adjustments will need to be made, which may be slow to implement. For example, in urban Ethiopia, the end to public sector recruitment implied an extremely large increase in unemployment among secondary school leavers (they now have the highest unemployment incidence), suggesting that past educational investment is not optimal anymore in current conditions. Similarly, many cash crops are permanent, and while incentives to grow tradables may have increased, for some households responding to this would require a substantial change in their asset portfolio, an adjustment which may easily go wrong. The result may be that some are not in a position to benefit from new conditions, unable to adjust their activity portfolio in the short run. There is evidence from Latin-America that these rational responses to crisis have indeed hampered the recovery of some of the poor, implying that their vulnerability remained high even though opportunities had increased (Ferreira et al. (1999)).

- *Some relatively standard economic reform measures for pro-poor growth may be contributing to substantial vulnerability reduction. But some may be conflicting.*

Keeping these dimensions in mind when designing and implementing reform programmes may assist in ensuring that vulnerability is also reduced, beyond simple safety net policies. Examples of possible vulnerability reducing policies in the context of economic reform programmes could be the following. Note that many of them hardly differ with pro-poor growth or poverty reduction policies. The added vulnerability focus may assist in prioritising relative to other measures as well.

- Macroeconomic stability (with low inflation) could avoid erosion of the asset base and provide incentives to use savings (self-insurance) as a means of dealing with downside risk.
- Better functioning markets for both assets and products would contribute as well. Lower transactions costs due to better infrastructure and encouragement of entry of traders into particular trade routes will have important benefits via risk sharing of shocks across larger geographical areas. Better market integration via the erosion of constraints and taxes on moving commodities around would have a similar impact.
- Micro-credit programmes could contribute to building up assets which can also be used for buffering consumption. Rarely are households directly allowed to acquire consumption credit as part of these periods, despite high demand. This is despite the fact that micro-credit programmes (in terms of repayment rates) are often put under serious strains just because there is often no insurance element.
- Micro-savings and insurance initiatives, e.g. via the pooling of risks across community level risk-sharing mechanisms are totally underexplored in this age of booming interest in micro-credit institutions. The advantage is that they would build directly on existing widespread local institutions (women's groups, burial societies, etc.) so it could strengthen social capital as well.
- While in the long-run, households will still have a demand for health and education, in the short-run, the need for survival may imply a temporary withdrawal from schools or interruption in health monitoring, preventive health care and general curative care. Cuts in social expenditure, especially on basic health care and primary education would obviously be detrimental, but there may

even be a case to increase these particular expenditures despite total expenditure cut backs just to keep enrolment and health care use unchanged, since opportunity costs of schooling and health care expenditure may have increased. Cost recovery at these levels is particularly risky in the early days of reforms.

But some of these policies may be contradictory: concerns for increasing protection against risk and fluctuations may conflict with policies designed to encourage long-term pro-poor growth and fighting permanent poverty. A few examples:

- While the erosion of financial assets and pensions during periods of high inflation or exchange rate crisis may make shock therapy to reach zero inflation desirable, the required cutbacks in public investments or private consumption to obtain this target may conflict with efforts for long-term poverty alleviation.
- Efforts to stabilise seasonal price fluctuations by public intervention and price controls in food markets, to limit exposure of those vulnerable to seasonal poverty may conflict with long-term pricing and marketing policies to stimulate pro-poor growth in rural areas, as the experience in many African countries in the 1970 and 1980s had shown.
- Job protection and labour market controls may limit the employment and income impact of shocks, including structural adjustment processes, and therefore reduce short-run vulnerability to poverty. But if the reallocation is necessary for reforms to work, it may be contradictory with long-term pro-poor growth.
- Priorities in health and education spending may be contradictory: while providing access to education and health to the permanent poor, via building new clinics and schools in remote areas, may be crucial for long-term poverty reduction, using these scarce resources to provide incentives to protect the past education and health investment of those who risk cutting back on it due to crisis. As a consequence, balancing long term poverty alleviation and short term protection of past investments is required.

5.5 Public safety nets, informal insurance and changes in vulnerability

- *Traditional coping mechanisms, such as via mutual insurance, is likely to come further under pressure with economic mobility, wealth differentiation, changing age profiles and the AIDS crisis in the developing world. Also the security of access to land and commons is also coming under further pressure.*

Earlier in this paper, the potential fragility of informal mechanisms for coping has been referred to. Many of these schemes rely on limited economic mobility for their sustainability. Economics growth, with widening wealth differentiation and mobility, create incentives for the better-off households to leave the risk-sharing schemes. As they exit, the welfare gains from the scheme to those remaining in the system fall, and it can unravel. Mutual insurance may especially be vulnerable to these processes. Other processes, such as the changing age structure with lower fertility and lower mortality almost everywhere in the world also puts pressure on informal arrangements, especially those geared towards old-age security. Other processes also undermine mutual insurance. For example, especially in Africa, the AIDS crisis, with its rising mortality among the able-bodied adults, is bound to put serious pressure on many of the informal systems in operation. Funeral societies, informal health insurance schemes, labour sharing schemes

and other traditional risk coping systems are likely to come under increasing pressure, creating negative externalities on non-AIDS suffering families as well.

These different pressures do not just undermine mutual insurance systems, based on gifts, transfers and remittances. Access guarantees to assets such as land and commons, another traditional form of security offered in traditional societies is under similar pressures. Platteau (2001) documents a number of case studies in Africa, where access to land as a means of guaranteeing safe access to productive resources and common property resources becomes undermined in the process of economic growth and increasing land pressure[57].

- *Another source of increased vulnerability could be safety net policies themselves, however well-intentioned. For example, with imperfect coverage by or scope of the safety net, support to some individuals may result in negative externalities on others, via the breakdown of reciprocal arrangements.*

Pressure on traditional mutual support mechanisms is not only stemming from population or economic pressures. There may also be examples in situations were apparent risk and vulnerability reducing policies may actually make particular individuals even more vulnerable or poorer than before, and these cases should definitely be investigated. Let us consider a safety net, that aims to give support to those who are needy (in a clearly defined way) in times of crisis. If all works well, and coverage is perfect, this will obviously reduce the downside risks faced by individuals, so that their vulnerability to poverty is reduced. Suppose that these individuals are all part of informal systems, whereby the implicit rule is that the others support those who are unlucky. Given budget constraints, targeting of the transfers is attempted in practice. Since in any context, information on individuals is imperfect, it implies that every programme will make some targeting errors, however hard one tries to avoid it. Some that are not needy manage to get support, while some needy may be wrongly identified as non-needy. Most people would agree that this is quite unavoidable, especially for non-needy to capture some of the rents of safety net policies.

However, it may well happen that these non-needy, noticing that they are now covered by a formal safety net, may now find it in their interest to leave the informal reciprocal arrangements, since their risks are now covered by formal means. The consequence may be that the informal network breaks down. The needy not covered by the safety net or only covered for some risks lose out, since they lose the protection offered by the informal arrangement. An example would be the local emerging middle classes breaking off contact with their lower class neighbours and networks. The result of middle classes being covered by a safety net would be *less* risk protection for the more needy groups. In short, covering one person by a social safety net or by social security may have negative externalities on others.

Other examples would be that for some period, a formal safety net gives a high degree of protection to everybody, crowding out the informal networks. However, suppose now that

[57] Such rules existed even in communities with a tradition of land sales and transfers. The practices implied, for example in East Uganda, that sales were typically preferentially to members from within the community and if sales were needed to cope with hardship, implicit rules would guarantee priviliged access to the local land market later on (Platteau (2001)).

for some reason, the formal system breaks down (say, due to a change of policy or serious budgetary cutbacks). The former informal system needs trust and repeated interaction to rebuild – which cannot be easily or quickly done. The overall effect of the safety net policy on vulnerability may have been even higher vulnerability in the long run.

- *Rationing of transfers in safety nets or unpredictable coverage and scope, as in food aid programmes, implies that very little security is offered. In fact, it is possible that it even results in some households being more vulnerable than without due to the uncertainties of the formal safety net.*

Finally, rationing of transfers in the formal system is also very common. Food aid distribution is good case in point. For example, the government has a policy of providing food aid or jobs in the form of food-for-work to the needy. It may even have sophisticated mechanisms of targeting, including a well-designed self-targeting mechanism. However, the overall coverage may be insufficient e.g. simply in terms of the spatial coverage, due to transitory problems in transport or capacity to handle more than a fixed number of applicants for food-for-work jobs. In Ethiopia, for example, studies show that all these problems are very relevant (e.g. Sharp (1997)). However, most of the time this is viewed from the point of view of project management or targeting. The key perspective, the impact on vulnerability, is largely ignored. The result is that in Ethiopia, even if one were to accept that everybody has the best intentions, the security offered by the food aid program is minimal; for some it may actually have caused an increase in vulnerability.

- *Any policy to reduce vulnerability requires clear commitment and credibility. In the first place, it must be predictable.*

Survey data have suggested that the correlation of food aid converge with serious rainfall shocks – still a main cause of vulnerability in Ethiopia, see table 15 and 16 – is quite positive, but far from perfect. The result is that sometimes support will come and sometimes it will not materialise when a crisis hits. For example, in a panel data sample of 15 communities discussed before, of which many very poor and vulnerable, programmes were never present during all the three survey periods. Villages with high needs were only covered a year or so too late, others never, while others received support when needed. Within-village targeting and coverage was very variable – and quite different over time. In all, access to food aid or food-for-work was difficult to predict for a particular individual, implying serious risks of exclusion. Some households may well have overestimated the likelihood of receiving support, taking donor and government pledges at face value, especially after a period of support with wide coverage and generous transfers, and taken more risks than they otherwise would have done, and so effectively facing even higher vulnerability because of the promises of a safety net.

The key point here, for any formal safety net and for any risk reduction policy, is that such a policy needs commitment and credibility. It should be permanent and transparent; moreover: it should be highly predictable. In many developing countries, especially highly aid-dependent ones, this is definitely not the case.

6. Conclusions – and the way forward (Executive Summary)

This paper has presented a framework to describe and analyse poverty, risk and vulnerability. It has discussed the possibilities to measure vulnerability to poverty, with an emphasis on quantitative techniques. Finally, it has discussed some of the recent challenges and issues related to a policy to reduce vulnerability.

Although some of the analytical methods described are in their infancy and the data requirement are high and currently not met, it is important to bring some of these issues higher on the policy agenda, including when assisting and contributing to the design of poverty reduction strategies, such as in the context of PRSPs and other key policy declarations. One important reason is that vulnerability and risk is increasingly shown not to be just another dimension of poverty; it is also a cause of poverty and destitution.

I have argued that expanding quantitative data collection and research is going to be especially helpful, if only to provide a clearer focus in policy discussions. Little is currently known about the size, frequency and relative importance of different risks faced by households and individuals across the developing world. More should be known about the ability of individuals, households and communities to cope with events and shocks, as well as with fluctuations such as seasonality. Bringing this into the discussion, e.g. in the form of vulnerability profiles similar to the standard quantitative poverty profiles, could be very helpful.

Vulnerability must be defined relative to some benchmark. The natural benchmark would be vulnerability to poverty. Poverty should be considered in its various dimensions. Vulnerability to one dimension does not necessarily mean vulnerability to another. The lack of a 'single' dimension for discussion should not be a problem, even in quantitative work. It is perfectly feasible to discuss in quantitative work vulnerability to poor education, to poor health and to income poverty as separate dimensions of vulnerability to poverty. Vulnerability is also forward-looking: it makes a statement about future poverty.

Vulnerability is then defined as ex-ante poverty, i.e. before one knows what the outcome of risk variables will be. A measure could try to count those that have a high probability of being poor in the next period or further in the future. It could also weights of the extent of deprivation that is possible e.g. how deep below the poverty line one may fall. Using this definition, it is clear that not only poverty due to risk should be considered: measures of vulnerability should also include those not expected to move out of poverty, those that will move permanently into poverty and those falling into poverty due to predictable fluctuations, such seasonality. Nevertheless, it would be useful to be able to distinguish these different groups in analysis. Vulnerability analysis could include decomposition into who is most at risk and from which sources of risk. Furthermore, disentangling poverty and its determinants into permanent factors, shocks and fluctuations would be illuminating too.

In section 4 some ways of measuring vulnerability were proposed. Currently, much work is going on to construct outcome-based measures. These are measuring vulnerability to income poverty, low education, malnutrition, etc. The underlying ideas and data needs were described. Some improvements were suggested, such as using direct measurement of shocks and modelling taking into account the responses to shocks. There should not be

a unique focus on outcomes only: assets and activities form important determinants of vulnerability. The problem of measuring these determinants of the vulnerability process is that their current values or levels are not what matters, but the ability to mobilise them when needed. More work is needed to explore these dimensions, as well as on measures informing on coping strategies used.

Data needs are high, but one should begin to tackle these gaps. It is a priority to improve our understanding of the type, magnitude and frequency of shocks faced by households in developing countries. Non-contextual survey techniques should collect quantitative data on risks and the relations between risk (including covariances). More information on the extent to which assets, including human capital and social capital can be relied on to cope with hardship would also be needed. Work on informal mutual support mechanisms, their functioning and changes over time would also be important. Contextual, qualitative approaches could play an important role in this process, but more systematic ways of integrating this information into quantitative work would be required, involving more attention to sampling frames and ex-post quantification of this work.

The ability of households and individuals to cope with hardship is also changing rather rapidly and should remain a focus of future work across the developing world. Traditional insurance mechanisms are under pressure from factors such as population growth, wealth differentiation, changing age structures of the population and the impact of AIDS. It is also important to study further the impact of processes of globalisation and domestic market liberalisation. Markets effectively spread risk over large distances and people. Trading risk is beneficial to individuals. But it also implies that many 'natural' shocks become less important and are replaced by 'man-made' shocks, affecting different people and in a different way. Also, market and institutional imperfections may contribute to shocks being exacerbated within the system. Economic reform processes also involve shocks that some may find very hard to deal with. It should never be underestimated that vulnerability is likely to have increased considerably in the period predating reform, since the single most important reason for changing policy is deep economic or political crisis. This increased vulnerability will limit the ability of households to respond to new incentives.

The paper also focused on sources of risk and vulnerability that are largely ignored thusfar. Public service provision, typically rationed in many developing countries (such as clinics running out of drugs or absent teachers) imply serious risks faced by households to transform income and assets into outcomes, such as health and education. Indeed, this is an example why it would be fruitful to distinguish different poverty dimensions in analysing vulnerability to poverty: even if these risks do not affect vulnerability to income poverty in the short run, they imply serious risks to health and education.

I have also suggested situations were safety nets – or in general social protection policies - could be sources of vulnerability. Since risk and uncertainty are crucial for households perception of vulnerability and their responses to it, more so than in any other field, the issues of commitment, credibility and predictability of both government and donor policy are pre-requisites for vulnerability reductions from policy.

For policy makers, concerned with issues of vulnerability, this seems a large agenda. Many of these issues require much more research and a close interaction between

academics and policy-makers both in developing countries as in donor countries. On the ground, for example in the current PRSP discussions, it is nevertheless possible to include some of these themes. For example, much debate on growth and poverty, and on the design of pro-poor growth policies focuses on raising mean incomes of the poor. For example, packages including credit or modern inputs may be provided to rural farmers. Ex-ante, the expected impact is typically discussed in terms of a 'normal' year or 'normal' international circumstances. In a world with high variability and risk, a more fruitful approach would be to also focus on when things go wrong, for example if a drought hits or international commodity prices collapse (however temporary the shock is). Focusing on such 'worst case scenarios' would check how robust the policy package and its likely welfare impact would be in bad circumstances. Questions to ask would include what the impact on different groups would be in this scenario? Can one credibly guarantee to keep public service delivery going at current terms? Will the safety net be sustainable in this context and provide sufficient protection?

Finally, it is worth stressing that the World Bank, via its Social Protection Unit, has taken quite a few of the issues raised in this paper forward in recent years. Nevertheless, it is worth listing some of the elements raised in this paper, that are generally missing or given less prominence. First, much of the quantitative work encouraged or supported has thusfar focused on income poverty. The discussion in this paper has shown that there is no need to do so. Next, the focus in their work appears to have been on head count measures of poverty, ignoring e.g. information about the depth of poverty or the inequality among the poor. Again, there is no need to so. Also, by focusing exclusively on risk, it ignores that fluctuations could also be very harmful to households, since given credit, asset and good market imperfections responding to predictable fluctuations such as seasonality is also difficult. Including this dimension seems important, if only since other standard work focusing on chronic or permanent poverty also does not include it. In the World Bank work, one also appears to ignore (relatively speaking) certain risks, including the risks of exclusion from informal support system, the risks related to public service provision and risks related to access to assets. Finally, their work has largely ignored risks related to policy credibility, long term commitments, including from donors and the risks of exclusion from vulnerability reduction policies, especially from safety nets.

Annex 1 Questions related to table 15 (Ethiopian Rural Household Survey – edited version)

EVENTS DURING THE LAST KIREMT SEASON

Please think back at the last main rainy season (Kiremt). We would like to know whether any of the following events happened to you which affected the growth of your crops and the harvest. These questions should be asked to all farmers who harvest during the Meher season, AND ALL FARMERS WHO GROW PERMANENT CROPS; and any other farmers for whom these rains can be relevant. Space is provided to qualify answers if needed.

1. **Are the Kiremt rains important for your crops?** YES....1,NOT VERY IMPORTANT....2 , NO.....3 [.....]

IF NO, GO TO QUESTION 7

2. **According to your own plans, did the first Kiremt rains come on time?** ON TIME.....1 [.....]
TOO LATE.....2
TOO EARLY....3

3. **Was there enough rain on your fields AT THE BEGINNING of the rainy season?** ENOUGH.....1
TOO MUCH....2 [.....]
TOO LITTLE..3

4. **Was there enough rain on your fields DURING the growing season?** ENOUGH.....1
TOO MUCH.....2 [.....]
TOO LITTLE....3

5. **Did the rains STOP on time on your fields?** ON TIME.....1
STOPPED TOO LATE.....2 [.....]
STOPPED TOO EARLY....3

6. **Did it rain near the harvest time?** YES.....1
NO.....2

7. **Did any of your crops suffer from any of the following factors?** YES.....1
NO.....2

Low temperatures	Wind/storm	Flooding/water logging	Plant diseases	Insects	Livestock (eating/trampling)	Birds/other animals	Weed damage

8. **Please mention the crops which were most affected by the weather, by insects, animals or pests during the last Meher season (or equivalent period), and mention whether they were moderately or very badly affected**. (up to three). Give comments if necessary.

CROP **code (a)**	HOW AFFECTED: MODERATELY.....1 SEVERELY.....2	comments

Annex 2 Long term shocks module and coping: from Ethiopia Rural Household Survey 1994/95

IN THE LAST 2O YEARS, since the land reform prorgramme, has your household suffered any of the following crises: an event that thoroughly affected the household. Give details about the worst crises during the last 20 years.

CRISIS	CAUSE OF CRISIS	CODE	When were the three worst crises of this kind during the last 20 years? (record according to the order of priority)			Was that problem: SEVERE.....1 MODERATE....2 ?			Did you have to look for help outside the household? YES...1 NO....2			How widely experienced was the crisis? **(a)**		
1. In the last 20 years has the household suffered a substantial loss of harvest through any of the following?	drought	1												
	too much rain and flood	2												
	pests and diseases	3												
	harvest losses in storage	4												
	frost and hailstorm	5												
	other _____													
2.1. In the last 20 years has the household suffered a substantial loss of oxen through any of the following?	livestock disease	6												
	theft	7												
	death due to drought	8												
	distress sales due to drought	9												
	other _____													
2.2. In the last 20 years has the household suffered a substantial loss of livestock (other than oxen) through any of the following?	livestock disease	10												
	theft	11												
	death due to draught	12												
	distress sales due to drought	13												
	other _____													
3. In the last 20 years has the household suffered any loss of land?	peasant association reallocation	14												
	lost a dispute	15												
	transfers among family members and relatives	16												

CRISIS	CAUSE OF CRISIS	CODE	When were the three worst crises of this kind during the last 20 years? (record according to the order of priority)			Was that problem: SEVERE.....1 MODERATE....2 ?			Did you have to look for help outside the household? YES...1 NO....2			How widely experienced was the crisis? **(a)**		
4. In the last 20 years has the household suffered any important loss of labour?	death of husband	17												
	death of wife	18												
	other death (specify)	19												
	illness of husband	20												
	illness of wife	21												
	illness of other members	22												
	conscription	23												
	son leaving voluntarily	24												
	daughter leaving	25												
	divorce	26												
	other													
5. In the last 20 years has the household suffered any losses of house or household assets?	destruction of house (fire, rains, ...)	27												
	theft (of assets)	28												
	villagisation	29												
	other													

EVENTS	REASON FOR SUFFERING	CODE	When were the three worst crises of this kind during the last 20 years? (record according to the order of priority)			Was that problem: SEVERE....1 MODERATE..2 ?			Did you have to look for help outside the household to cope with the crisis? YES...1 NO....2			How widely experienced was the crisis? code **(a)**		
6. In the last 20 years has the household suffered a considerables loss of income from any political regulation or event?	villagisation	30												
	resettlement	31												
	banning of migration	32												
	banning of wage labour	33												
	AMC quota's	34												
	forced contribution	35												
	forced labour	36												
	other _____													
7. In the last 20 years has the household suffered a substantial loss of income from any military event?	adbuction of men	37												
	abduction of women	38												
	destruction of market place	39												
	destruction of crops/livestock	40												
	death of household member through war	41												
	disablement through war	42												
	other _____													
8. In the last 20 years has the household suffered considerable loss of income or wealth from any illegal activity (such as banditry, violent conflict, etc.)?	Banditry (loss of goods/cash)	43												
	Banditry (death of household member)	44												
	Banditry (disablement of member)	45												
	conflict within PA (death member)	46												
	conflict within PA (disablement)	47												

(d) Relationship

FATHER..... 1
MOTHER..... 2
SPOUSE'S FATHER..... 3
SPOUSE'S MOTHER..... 4
BROTHER..... 5
SISTER..... 6
SPOUSE'S BROTHER..... 7
SPOUSE'S SISTER..... 8
AUNT/UNCLE..... 9
SPOUSE'S AUNT/UNCLE..... 10
COUSIN..... 11
SPOUSE'S COUSIN..... 12
NEPHEW/NIECE..... 13
SPOUSE'S NEPHEW/NIECE... 14
OTHER KIN..... 15 (SPECIFY.....)
FRIEND..... 16 (SPECIFY.....)
PATRON..... 17 (SPECIFY.....)
ELDERS..... 18
IDIR..... 19
MEHABER..... 20
EQUB..... 21
CHURCH..... 22 (SPECIFY.....)
MOSQUE..... 23
OTHER ASSOCIATION..... 24 (SPECIFY.....)
PEASANT ASSOCIATION..... 25
NGO..... 26 (SPECIFY.....)
GOVERNMENT..... 27 (SPECIFY DEPT.....)
OTHER..... 28 (SPECIFY.....)

(a) Incidence of crisis:

AFFECTED PEOPLE BEYOND WOREDA 1
AFFECTED EVERYONE IN THE WOREDA 2
AFFECTED SOME IN THE WOREDA 3
AFFECTED EVERYONE IN THE PA 4
AFFECTED SOME IN THE PA 5
AFFECTED A FEW IN THE PA 6
AFFECTED HOUSEHOLD ONLY 7

(b) Residence:

IN THIS PA.....1
IN A NEARBY PA (<20 KM AWAY).....2
IN A RURAL AREA IN THIS REGION >20 MILES AWAY.....3
IN A NEARBY TOWN .....4 SPECIFY.....)
IN A TOWN > 20 KM AWAY .....5 SPECIFY.....)
IN ADDIS ABABA.....6
OUTSIDE ETHIOPIA.....7 SPECIFY.....)

(C) Kind of help

GIFT(CASH).....1
GIFT(KIND).....2 (SPECIFY.....)
LOAN (CASH).....3
LOAN (KIND).....4 (SPECIFY.....)
LABOUR (LONG-TERM RESIDENT).....5 (WHAT RELATIONSHIP?....)
LABOUR (HELP WHEN NEEDED).....6
LAND WITH NO CHARGE.....7
LAND FOR RENT.....8
OXEN.....9
OTHER EQUIPMENT.....10
SHORT-TERM HOSPITALITY FOR SOME OF HOUSEHOLD...11
SHORT-TERM HOSPITALITY FOR ALL OF HOUSEHOLD....12
MIGRATED TO LIVE WITH THEM.....13
OTHER.....14 (SPECIFY.....)

9. If the household ever turned for help outside the household to cope with any of the crises mentioned, give details. Who did you turn to for help? Give details. If more than three times, mention the three worst crises only.

Name	Relationship to head (d)	Residence (b)	Kind of help (c)	Can you estimate the value of the help (in birr)?

10. Have you helped any of the above-mentioned through a major crisis in the last 10 years? YES 1
NO 2 Q11

Name	Relationship to head (d)	Year	Kind of help (c)

11. Have you helped anyone else in the last 10 years?

Name	Relationship to head (d)	Year	Kind of help (c)

12. Taking the latest crisis, have you recovered to the position you were in before it happened?

YES 1
NO .....2 NEXT SECTION

13. How long did it take you to recover?

No. of years:

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