



# Incorporating Global Food Price Spikes into the Risk Management Agenda

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## Preface

This study has been undertaken as part of the ODI project, *High and Volatile World Food Prices* which is funded by DFID. In reviewing specific ways in which international action by the UK government can assist in preparations against future shocks in basic (cereal) prices, the ODI programme specifically recommended: “work to incorporate food price shocks into Disaster Risk Reduction Strategies” (Wiggins et al, 2010b p.2). This challenge is taken up here in an exploratory study which has been prepared during a fresh period of historically high and volatile global food prices beginning in mid 2010 that has underlined the uncertainty surrounding food prices. There is no agreement on whether we are currently still in a transitory and infrequently occurring episode of extreme volatility or have entered a new era not just of rising prices but instability. The paper sets out an approach to considering risks in such conditions of uncertainty which could be adopted in assessing risks and determining appropriate policy responses at a country level, especially in a low-income country. The approach proposed is both open and eclectic – let’s not be dogmatic or doctrinaire, but begin by making a provisional context specific assessment on the basis of the quantitative and qualitative evidence available and that considers all the policy options.

A decision was made not to update the statistical analysis beyond December 2010, but the course of events in 2011 and attempts to interpret them only serve to underline continuing uncertainty about global markets and coincident natural disasters. A regional drought related food crisis has erupted in the Horn of Africa centred on conflict-affected Somali co-incident with the current food price spike. One of the authors was involved in 1991 in a review undertaken by the World Bank of the risks of a regional drought and food insecurity in Sub-Saharan Africa. This review was triggered by the forecast of a high risk of an El Nino associated drought in the Sahel by an early generation climatic model. In the event it was southern Africa that was in crisis in 1991-2. Nevertheless, focusing on implications of a regional drought ensured that country economists for affected states such as Zambia and Zimbabwe were alerted to the risks and responded rapidly to this shock (Benson and Clay, 1998). There is a continuing need for anticipating and preparedness against high and seemingly lesser risks under the prevailing conditions of uncertainty.

The study has been undertaken by Edward Clay, Sharada Keats and Piet Lanser who is primarily responsible for the Sahel case study. The authors would like to acknowledge the advice of James Boyce, Andrew Dorward, Gary Eilerts, John Farrington, Frank Galtier, Steve Jones, Simon Maxwell, Steve Wiggins and of officials in various agencies who made available information that facilitated the study. All opinions as well as errors and omissions are the responsibility of the authors.

## Summary

Global food price spikes (GFPS) pose a substantial threat to poor people's livelihoods and food security, especially in low income countries (LICs); and so reducing these threats is a key issue in the poverty and development agenda. This paper seeks to integrate the risks posed by price volatility with a second major source of systemic risks in these countries, natural hazards.

It would be naïve to envisage that these risks will be managed on a purely rational basis of assessing probabilities and outcomes. This is inherently a political process with powerful actors. Those with political responsibilities are likely to be most strongly influenced by immediate events in shaping their perceptions of risk. There are strongly contended views on how best to address current food price volatility and its socio-economic consequences. For example, in Bangladesh, in what is now the fifth year of extreme price volatility for basic foods, the Prime Minister responded in January 2011 to rice prices that were at least 30–40% higher than a year ago by proposing a massive increase in food subsidies through open market operations and the extension of ration and fair price to around a quarter of the population. In contrast the World Bank President in an open letter to the French G8/G20 Presidency identifies a range of ways of doing better to enable poor people to cope with price volatility whilst conspicuously de-emphasising international or national level interventions through trade measures, open market operations and stock management: 'the answer to food price volatility is not to prosecute or block markets, but to use them better' (Zoellick, 2011).

The paper explores ways in which food price volatility, understood as large and difficult to anticipate movements in prices, can be incorporated into a formal analytic framework for assessing systemic disaster risks. A three stage approach is proposed to identify appropriate policy responses to global food price volatility as a form of systemic risk in circumstances of highly incomplete knowledge, following Sterling (2007), Anton (OECD, 2009) and Galtier (2009). The sustained pace of change within the global economy, including trade and financial systems, is unprecedented. The socio-economic consequences of climate change, for example extreme weather at a localised scale in 5–10 years, are uncertain (as the next Inter-governmental Panel on Climate Change (IPPC) review will probably confirm). Each stage in the assessment involves organising our understanding of the risk in a simple tabular format.

The *first stage* is an aggregate level assessment of each potential source of systemic risk that affects whole regions and nations. Here we adopt the approach of Stirling (2007) to the risks posed by extreme events, considering explicitly the current state of knowledge about the likelihood (probability) and how well characterised is understanding of outcomes (magnitude of impacts) (See Tables 2 and 12). Whereas policy actors and many analysts would prefer to consider price spikes and natural hazards as "risks" with firm probabilities and well understood potential outcomes, there is uncertainty, for example, about both the likelihood or the outcomes of a coincident global food spike and an extreme regional scale drought in the West African Sahel.

The last extreme regional drought in the West African Sahel was in 1982–4. The fuller integration of markets and also possibly increased vulnerabilities exposed by the more localised crises in Niger in 2005/6 and 2009/10 imply less well characterised outcomes: it is difficult to know how severe such a crisis will be, and how it will play out.

There is lack of consensus about the role of different influences in causing the 2007/8 global food price spike, especially the role of financial speculation in amplifying volatility (Annex A). There is difficulty in interpreting the events of 2010/11. Is this a continuation of an infrequent period of extreme price volatility, similar to the world food crisis of 1972–75, or the second episode in a new era of greater commodity market volatility? The difficulty in interpreting these events has profound policy implications at national, regional and international levels.

The *second stage* is to adopt a layered approach to the management of systemic risks, distinguishing broad bands of high, medium and catastrophic but low risks at a country level. We use the tabular template proposed by Anton (OECD, 2010) as in Tables 4, 6 and 8. This



framework is open, allows the repositioning of risks, for example as these are evaluated through expert elicitation. The risk assessment includes determining likely outcomes, as well as the probability of extreme natural events. Thus the spread of irrigation and associated changes in seasonal cereal production in Bangladesh implies placing extreme drought within the medium rather than the high risk band. Critically the layered approach provides a knowledge related basis for then considering the appropriateness of different forms of public actions.

The *third stage* is using Galtier's (2009) ABCD matrix, a fourfold categorisation of policy instruments employed in *limiting* price volatility or *reducing the effects* on incomes and livelihoods, especially of poorer people as food consumers and/or producers in low income countries. Instruments may be employed to *facilitate decentralised* or market-based actions. These might include A) the retention of risk by economic actors or B) risk transfer. Other instruments involve *direct interventions* C) *to limit instability* in prices and production, or D) *to protect* incomes, consumption and other aspects of food security and well-being such as nutritional status and health. This framework can be extended to include natural hazards, where the distinction in risk management is between encouraging *decentralised action* – self-protection and adapting livelihood strategies to known risks and *direct public action* such as land use regulation and flood protection to reduce risks.

We explore the usefulness of this three stage approach through three purposively selected highly disaster-prone low-income country cases. Bangladesh, because of food import dependence and a relatively liberal trade regime, has been fully exposed to recent food price volatility: the first price spike coincided with two domestic disasters, a severe extreme flood followed by an extreme cyclone and storm surge in 2007. Malawi is largely insulated from global volatility because of location and weak transport linkages, but is experiencing more extreme domestic food price volatility than on global markets. In the West African Sahel Burkina Faso, Mali and Niger are characterised by strong intra-regional market interlinkages, but relatively weaker international connections and recent differences in governance.

The three stage framework is useful for quickly providing a provisional assessment of risks, drawing on readily available data on hazard and price spikes, and then indicating areas for further in-depth assessment. There is uncertainty about all major hazards and price volatility probabilities. Hydro-meteorological risks are being modified by anticipated climate change. The likely *outcomes* of hazardous events and price volatility are found to be changing rapidly because of rapid environmental and socio-economic development and change. However, the extent of increasing invulnerability may be insidious, unnoticed until a crisis breaks, as in Malawi in 2001/2 and Niger in 2005. Consequently, on a precautionary principle, it is advisable to place specific risks within broad probability bands or layers of risk (Tables 4, 6, 8). Single value estimates of expected risk are likely to be misleading for policy purposes.

We find that in conditions of uncertainty this framework provides a reality check against certain tendencies to formulate policy with tunnel vision. Some governments may set *inappropriate* longer term policies whilst preoccupied with immediate crisis. The rapid expansion of a publicly subsidised food distribution in Bangladesh already cited could be ineffective as a social protection measure, without careful consideration of implications for the whole rice economy and the enhanced management capacity required without addressing issues of weak governance.

There is the question of sustainability. Malawi successfully responded to the food insecurity implications of smallholder production sensitivity to extreme domestic food price volatility with large scale input subsidisation – that is combining productivity and social protection objectives – but the budgetary implications are now daunting.

Others appear to be searching for empirical justification for continuing to promote unqualified global liberalisation, which is a theoretical position: that the outcomes of market processes such as forward market trading will, if unhindered by lack of information or misguided public interventions, be stabilising. In contrast, no-one makes an unqualified case for direct public action – the arguments are context specific.

Our review of public actions to reduce instability and minimise the consequences of instability in low income developing economy, and especially vulnerable groups within society, is organised in terms of Galtier's (2009) classification (see Tables 5, 7 and 9).

*Facilitating decentralised risk absorption.* Information is a key constraint on markets functioning more efficiently and enabling market actors with the resources to do this to absorb risks. Information is also a necessary condition for enabling government and civil society to intervene where there is market failure or the poor are priced out of markets to support agricultural resilience, sustain livelihoods and protect the most vulnerable to food insecurity. There is near consensus on the importance of supporting the generation and dissemination of information as a public good.

The weaknesses in real time assessments of agriculture through the growing season and in agricultural production statistics are common long standing problems. Weak and often delayed assessments and statistics reflect not just lack of capacity and underfunding, but also pressures and negotiated figures. These issues are important in all our cases as they inform public action. In Bangladesh the precise drivers of extreme volatility in the spike from late 2009 are in doubt because of weak production data. The functioning of the early warning system in Malawi is compromised by weaknesses in real time pre-harvest and immediate post harvest assessments of production that are subsequently heavily revised. Uncertainty regarding the drivers of price volatility during 2008/9 contributed to poor quality public decisions in food security stock management and about regulated trade. The extent to which the food crises in Niger in 2005 and 2010 were the consequence of increasing vulnerability and weather-related poor cereal crops is unresolved but in each case had enormous implications for the public and international response.

Improving food security information systems as a public good and specifically incorporating prices and markets into these systems is a priority area for strengthening all areas of public and civil society action. There is a challenge here too for agricultural economists in redirecting their modelling efforts from long run equilibrium analyses with annual price data to understanding and forecasting short run volatility (Abbott, 2010).

In contrast, the much hoped for and much promoted *transfer of private and public risks* to international financial markets is in question. Where risks are uncertain, complex in causation and too high to transfer this approach will only be attempted when subsidised and is likely to prove unsustainable. For example, there are the so-called 'droughts', better described as complex, weather triggered disasters that have struck more than once in the last decade in both Malawi and Niger. There are likely to be specific and limited opportunities for risk transfer instruments where risks are well-defined, in an insurable range and there is very low probability of regionally covariant events. For example relatively stable domestic prices and an assured market for commercial growers are perhaps necessary conditions for the one widely accepted recent weather based crop insurance success story in India (Hazell et. al, 2010).

The *provision of social protection* through safety nets and post-crisis responses is another area of near consensus. But it is an incomplete response to vulnerability because of delays and limitations to responses where governments and civil society have difficulties in organising and delivering assistance. Even the small number of cases considered indicates that the precise forms of action and their likely effectiveness are highly context specific.

Price volatility also makes for a greater social difficulty in low-income countries where food is a high proportion of poor people's expenditure and so is crowding out other expenditure in a crisis. In particular, there has been insufficient attention to the ways in which price volatility can weaken social protection and this needs to be addressed especially for cash based transfers. Food based assistance implies intervention to procure commodities domestically or importing commercially or through food aid. However international food aid is often inadequate, and especially when global markets are tight, and often inappropriate. When there is both international and domestic market volatility, then external involvement in the domestic and regional procurement of food without having unintended distortion effects in thin markets is also exceedingly challenging.

In practice, *livelihood protection* is also an area of overlap between interventions to limit the impacts of shocks on livelihoods and food security and to support agricultural recovery involving the same instruments. Subsidised input distribution is providing social protection to subsistence smallholders in Malawi and promoting production. Livestock assistance for pastoralists in the Sahel has a similar dual function.

In addition to the four areas of intervention covered by Galtier and others focusing on price instability, macro-economic measures to sustain growth and development and their financial implications ought to be explicitly considered. These measures may well be quite different when responding to a distinct natural disaster shock, imported extreme price volatility or a coincident disaster and price spike. For example an extreme flood in Bangladesh is an economic shock that may require expansionary policies: central bank refinancing of micro-credit and publicly funded relief and recovery measures. However the general inflationary risk in a rapidly growing economy from an unanticipated imported food price hike may require that additional social protection and food system operations be funded as far as possible by reallocations within an existing budgetary envelope.

Most controversial is *direct intervention into markets* through trade measures, open market operations and stock-holding to reduce volatility as well as directly supporting agricultural resilience such as through subsidisation of inputs. These issues are extensively discussed in other studies as part of the ODI programme (Wiggins, *et al.* 2010) and elsewhere in a thoughtful way. For example, Poulson and others (2006) conclude that a credible national strategy for price stabilisation is desirable for Southern Africa. They and others increasingly accept the need for higher public and private, but publicly encouraged, intra-year and inter-year stock to usage ratios than have been favoured by IFIs and market analysts prior to the triple fuel, food and financial crisis of 2007-8. The subsidisation of and assurance of availability of inputs for small and self-providing farmers needs to be viewed pragmatically rather than just dismissed as inefficient and unsustainable.

*Uncertainties about continuing international market volatility* come after an era of relative price stability in which it was reasonable presume that liberalisation and integration into global markets would be domestically stabilising. But this rebalancing of perspective implies renewed and sustained efforts to strength governance and the quality of food system management.

Ellis (2010) suggests “private risk management, public risk management and social transfers represent a variety of overlapping methods for achieving a reduction in the frequency and severity of food insecurity crises confronting vulnerable people; and the future task is to get a substantially more accurate understanding of their appropriate coverage and the trade-offs between them.” The purpose of this paper has been to encourage just such thorough and highly context-specific explorations of market volatility in the wider context of other systemic risks.

In considering price volatility as an aspect of wider risk management we reviewed country national disaster risk reduction strategies and plans and found little attempt to assess hazard risks in a systematic way. The three stage approach was adopted: assessing risks, provisionally construct a layered framework of risks from the available data for different hazards and consider policy instruments with reference to these layers of risk. These investigations encourage us to recommend the incorporation of extreme price volatility as a specific threat into an aggregated risk multi-hazard framework, and, on the basis of available evidence, explore the policy implications of the implied layers of risk. Such an analysis could be a useful component of a considered wider review of food security or natural disaster risk management for example in countries which are particularly exposed to current extreme global food price volatility.

The uncertainty about likely short to medium behaviour of global agricultural commodity markets makes it difficult to quantify and integrate volatility with disaster risk management at a country level. The case studies suggest that the political economic problem is volatility rather than just price spikes. The aggregated response of governments and decentralised economic actors to a spike involves a high risk of a precipitate fall and extended market instability. The

behaviour of international markets and experiences of countries reviewed strengthens the case for a precautionary approach in those countries exposed to such volatility. There should be a presumption that the food economy is a learning system. Should there be more international sympathy for active food system management to minimise the exposure of vulnerable consumers and poorer producers? For example, should there be support for an incremental approach to increasing stock to usage ratios linked to better practice. How can social protection be more directly linked to food prices? The potential pressures on public finances and difficulties of managing interventions are well understood. Can international action facilitate regional cooperation to reduce the likelihood of national responses that amplify extreme events, for example in West and Southern Africa? The relative stability of the rice market 2010/11 compares interestingly with other cereal markets. The record stock to trade levels of rice during this period resulted from actions of major producing and consuming countries. There have also been interventions to dampen volatility by key exporters, Thailand and Vietnam. Such actions encouragingly suggest that some governments are closely examining and attempting to learn from the events of 2007/8.

# 1 Introduction

## 1.1 Vulnerable poor people, shocks and spikes: issue for investigation

Global food price spikes (GFPS) pose a substantial threat to poor people's livelihoods and food security, especially in low income countries (LICs); and so reducing these threats is a key issue in the poverty and development agenda. This paper seeks to integrate the risks posed by price volatility with a second major source of systemic risks in these countries, natural hazards.

*Extreme natural disasters* are potentially a major form of shock, impacting negatively on livelihoods and development<sup>1</sup>. These disastrous events are — from an economic perspective — exogenous but internal shocks that impact directly; causing loss of life, destruction of physical capital, affecting production and hence consumption, savings, and investment in physical and human capital. Poor people in poorer countries are the most vulnerable and the implications are distributionally highly negative too. Many countries are engaged in developing disaster risk reduction strategies. This is often with international support from UNDP and the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR) and bilateral agencies. Disaster risk reduction is in turn supposed to be located within wider Poverty Reduction Strategies.

*Commodity price volatility* is here understood as large and difficult to anticipate movements in prices (FAO, 2011). Such volatility, particularly petroleum price spikes and agricultural and mineral export price collapses, has usually been treated as a separate agenda – sensitivity to exogenous external shocks coming from the global economy (e.g. Collier and Gunning, 1996). For a low-income open economy global food price volatility is directly interacting with other influences on domestic production and consumption, including climatic variability and all the contingent features of public and private action such as inter and intra annual stockage. Widespread but often partial self-provisioning also combines to ensure that through the inter-linkages of domestic and external markets and the high share of food in poorer people's expenditure volatility impinges on livelihoods and food security.

Does it then make sense to explicitly incorporate GFPS into disaster risk management as a separate potential source of shock? How important is it to take into account the joint probability of an extreme disaster and a GFPS in disaster risk reduction policy?

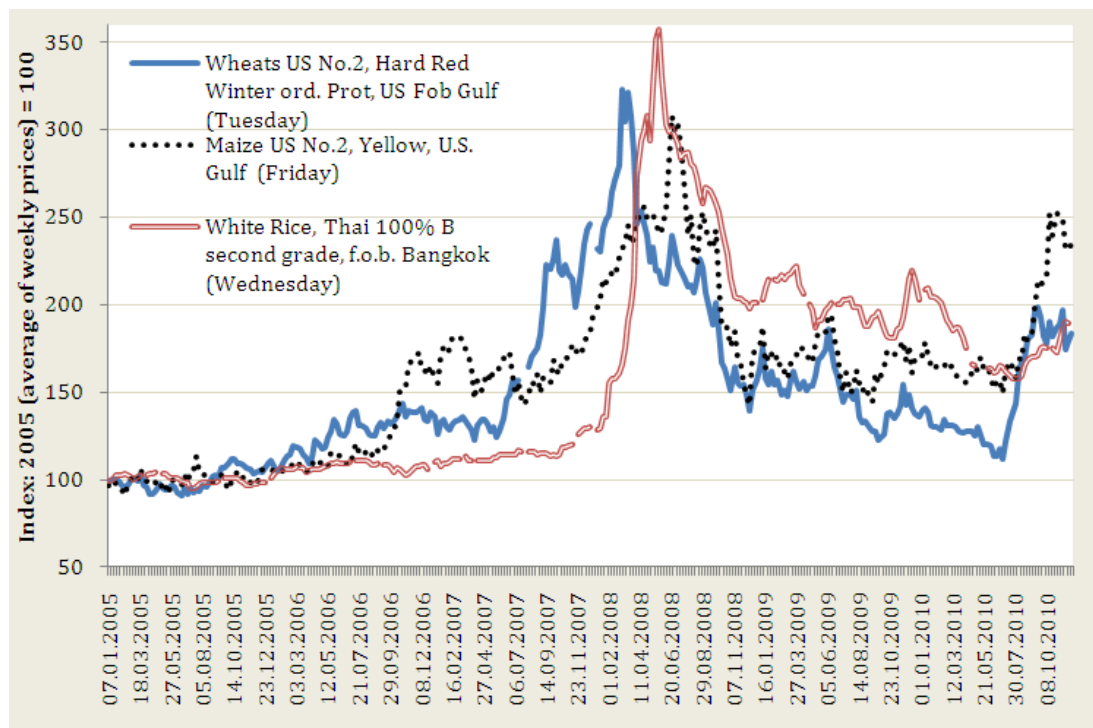
The investigation into the economic and social consequences of natural disasters typically finds these shocks to be context specific in terms of the type of hazard, the physical environment, economic structure, the immediate domestic and international circumstances and governance (e.g. Benson and Clay, 2004). Therefore a case study approach seems more appropriate for an initial exploration of the price shock disaster agenda interconnections. Here this is done by purposively selecting low income countries on the basis of two criteria: well-established sensitivity to natural disasters and the different ways and extent to which the 2007-8 shock impacted on these economies. A previous ODI paper makes a wide-ranging set of recommendations on a role for the international community (Wiggins, et al, 2010b). This paper in posing a question will be found to lead to many more questions about food shocks and hazard risks in a condition of highly incomplete knowledge.

<sup>1</sup> An extreme or severe natural disaster is here defined as a shock with economy-wide impacts for smaller countries, or at least state or provincial level for a very large economy such as Brazil or India. For example Loayza and others (2009) reviewing data for 94 countries covering 1961-2005 confirm finding from early investigations that 'severe' droughts, floods, storms and earthquakes all typically have economy-wide negative impacts on the medium term growth trajectory. See also Annex C Box 3

## 1.2 Issues, scope and method

This is a difficult moment to consider how to incorporate global food price volatility into the risk reduction agenda. The continually expanding body of retrospective analysis on the “2007-8 food crisis” indicates a lack of consensus regarding the underlying and immediate causes of that global food price spike (GFPS), or drivers of volatility, and the likelihood of another GFPS. Was it a “perfect storm” resulting from a highly improbable combination of factors? Alternatively did this extreme event herald a new era of relatively higher and more volatile food commodity prices associated with rapid structural changes in the global economy? What for example is the role of financial speculation in volatility? Is the 2010 surge in wheat and animal feed commodity prices (Figure 1) a fresh spike or a continuation of an extended episode of disturbed commodity and financial markets that began in 2006?<sup>2</sup> Interpretations of events in 2010 underscore the lack of consensus on that basic issue (see Annex A).

**Figure 1: International prices of wheat, maize and rice in an index form (2005 average weekly price = 100)**



The difficulties in interpreting and assessing in *real time* current market behaviour suggests that the likelihood and forms of future GFPS are an area of *formal uncertainty*. That conjecture provides the underlying assumption upon which this exploratory investigation is based, and is discussed further in Section 2.

<sup>2</sup> Wheat prices fell back in 2009/10 to close to pre-spike levels, only to rise again dramatically in July 2010 just prior to the Russian export embargo (Figure 1). However maize prices fell but remained at more than 50% above pre-spike levels before rising again since mid 2010. This pattern of volatility for maize is consistent with the influence of biofuel demand. Rice prices since falling from peak levels have been less volatile than the other widely traded grains indicating a different set of influences. There are high levels of stocks of rice to usage in the major rice producing countries and exporters, notably Thailand, have intervened to calm markets.



This study is part of ongoing research responding to proposal for such a paper that

“will develop lessons from the food price crisis to produce practical recommendations for the risk reduction agenda. This is a potentially large area so the study will start with a scoping phase to define boundaries and outputs. Specific areas to be scoped include: a brief review of social protection, disaster risk reduction and the extent to which they take account of food price shocks; the potential for incorporating international commodity prices into early warning systems; use of hedging tools by developing country governments to manage commodity price risk; and incorporating food price risk into national Disaster Risk Reduction Plans.”

The envisaged investigation therefore involves combining a review of the potential role for different categories of instruments in limiting price volatility and mitigating potential impacts in a risk management framework, and given current understanding of volatility and also the whole range of disaster risks, contextualising the analysis in conditions of uncertainty. This is a challenging task and so any analysis must be regarded as an exploratory investigation. After a selective review of three overlapping literatures on addressing agricultural price instability, framing policy in a context of uncertainty and managing disaster risks, the authors have chosen to combine three analytic frameworks for investigating these areas of policy:

- Stirling’s (1999, 2007) presentation of incomplete knowledge and the implications for framing policy problems under conditions of uncertainty;
- a layered approach to risk management as proposed for example by Anton (OECD, 2009); and
- Galtier’s (2009) classification for managing agricultural price instability.

*Case study approach:* This analytic framework is used to explore the incorporation of global price volatility into disaster risk management in three distinct country economy situations as reviewed in the context of the 2007-8 spike and subsequent market volatility.

- Bangladesh, where domestic prices of cereals were strongly and directly influenced by the transmission of international price volatility during 2007/8. Bangladesh is one of the best documented of low income countries for natural hazard risk, and it also provides illustrative examples of the state of incomplete knowledge about these risks.
- Malawi: a landlocked country where there is a large difference between export and import parity prices and considerable endogenous internally generated price volatility closely associated with rainfall variability.
- Burkina Faso, Mali and Niger: Sahelian economies where food production is also extremely sensitive to climatic variability. There is considerable interlinkage between intra-regional markets but the transmission of global price volatility was observed to be quite limited during 2007-8.

There are on-going efforts to produce disaster risk reduction strategies in these countries which were chosen as unaffected by the confounding influence of internal conflict. The major natural hazard risks considered in this study are those identified in the draft disaster risk reduction strategies.

*Outline of paper:* Section 2 sets out a framework for analysing risk in conditions of uncertainty (highly incomplete knowledge). Section 3 similarly provides a framework for analysing global price volatility in terms of specific country circumstance illustrated by the four selected case study countries and a categorisation of instruments employed in intervention to dampen price volatility and the impacts of food price volatility. Sections 4, 5 and 6 consider the incorporation of volatility into the existing disaster risk framework in Bangladesh, Malawi and the Sahelian countries. Section 7 looks at the role of the international community and finally Section 8 draws together conclusions and recommendations.

## 2 Risk management and uncertainty

In this section we propose a framework of three steps to explore systemically price risks in conditions of uncertainty. After clarifying the terminology of risk adopted here in step one we use Stirling's (2007) matrix as an approach to understanding aggregate risk in terms of probabilities and outcomes (section 2.3). Second a layered approach is employed to indicate appropriate ways of managing risks (section 2.4). The third step is a review of potential forms of intervention for managing risks using Galtier (2009) categories for managing specific risks in terms of objectives and governance (Section 2.5).

### 2.1 Introduction: an eclectic approach

The management of risk under conditions of uncertainty is a subject of increasing academic and public policy interest<sup>3</sup>. The implications of rapid structural change within the global economy and awareness of environmental change, especially global warming, as well as the recent extreme volatility in financial and commodity markets all contribute to that uncertainty. There is again a lack of consensus on how to frame the risk management agenda, with no agreement on 'best' approaches. This diversity of approaches is illustrated by contrasting the ways in which these issues are posed within a science policy framework (e.g. Stirling, 2007; ESRC et al, 2009) and by economists who formulate the assessment of risks as a problem within rational choice theory (e.g. World Bank, 2010b).

The approach adopted in this paper, which is directed to practical issues of risk management within national or development agency policy, is eclectic, looking for complementarities between different approaches rather than formal completeness and consistency.

### 2.2 Terms and definitions

*Risk management* is understood as the system of measures by which individuals and organisations contribute to reducing, controlling and regulating risks. This requires an assessment of risks to determine the frequency and magnitude of events. This perspective on public policy includes all the instruments in Galtier's matrix: risk communication, encouraging risk transfer, providing protection to reduce social impacts and intervention to reduce impacts of exogenous shock being transmitted into domestic markets (See below Section 3 and Table 2). Public action is understood to include national public agencies, civil society and international agencies.

Risk is commonly defined in two different ways. The classic distinction between risk, where estimates of probabilities are robust having a low variance, and uncertainty, where estimated probabilities have a high variance or are little more than informed guesstimates, is well established (e.g. Knight, 1921). However, the boundary between a condition of risk and one of uncertainty is blurred and a subject for expert judgement. For example expert judgement forms the basis for deriving a prediction about the likelihood of an El Niño event from an assembly of models (IRI, 2010).

'Risk' in the field of disaster management is an aggregate, conventionally defined as the product of the likelihood or frequency of an event occurring and its magnitude or impact. In principle these elements can be separately quantified using the tools of science and economics.

The conventional approach to analysing of risk in economics is to construct a framework upon the decisions of individuals as households or enterprises consuming or producing goods and services, and which are assumed to be based upon rational choices. The individual decision maker takes into account risks that have to be managed using available information to select

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<sup>3</sup> For example Mitchell (2009), Vervweig and Thomson (2006). In 2009-10 uncertainty and public policy was the theme of four workshops and a conference organised by CRASSH (<http://www.crassh.cam.ac.uk/>). Uncertainty and risk is the theme of the 2011 UK Development Studies Association annual meeting ([www.devstud.org.uk](http://www.devstud.org.uk))



an optimum strategy. Sub-optimal outcomes reflect risk aversion, poor information and market failure taking into account resources and preferences. The role for public policy is then to facilitate improved strategies for addressing the constraints on the functioning of markets on individual actions, to provide information as a public good and intervene with social protection measures when a catastrophic shock leads to market failure (e.g. World Bank, 2010).

Anton (OECD, 2009, pp 16-17) argues that this implicitly linear model of risk management mischaracterises reality with continuous feed-backs in terms of risks confronted by individuals which may be inter-related, the dynamic nature of risk and the role of government (public) policies. This is quite apart from the evidence from other social sciences that individuals do not make decisions in this linear rational way. For example there is widespread cognitive failure whereby decision makers underestimate the possibility of negative outcomes.

Newberry and Stiglitz (1981) in analysing commodity market risks address inter-related or covariate risk by distinguishing *individual* and *systemic risks*. Building on this distinction, the types of risk are usefully differentiated into micro (*idiosyncratic*) risk affecting individual enterprise or household, meso (*covariate*) risk affecting groups of households or communities and macro (*systemic*) risk affecting regions or nations (OECD, 2009, pp 20-21). Global commodity price volatility is characteristically *systemic* because all economic actors are potentially directly or indirectly affected through the inter-linkages in markets.

Newberry and Stiglitz (1981) make a further critical distinction between *systemic* and *non-systemic risks*.<sup>4</sup> Systemic risks relate to events that repeat over time with a pattern of probabilities that can be analysed so as to have a robust estimate of actuarial odds, or classical risk. In contrast non-systemic risks are characterised by short or imperfect record of occurrence, or, because of the environmental or socio-economic changes, data on past events are potentially a poor basis estimating the probability of future events and their magnitude (uncertainty).

*Catastrophic risks* are typically characterised as events with a low frequency, but involving high losses that wholly undermine the livelihoods of individuals, cause extreme socio-economic costs and disruption, including market failure on a localised, regional or economy-wide scale.

## 2.3 A framework for managing risks

Science policy analysts such as Stirling (2007) argue that it is necessary to unpack notions of systemic and non-systemic risk in terms of highly imperfect understanding of both the frequency and the magnitude or consequences of an event. As suggested below, frequency or likelihood are not necessarily easily separable from defining magnitude as reflecting destructive potential. The potential consequences are dependent on *vulnerabilities* to loss of life, economic damage and loss of or reduced activity or consumption as for example in the case of extreme earthquakes (Box 1).

### Box 1: Disaster magnitude, impacts and vulnerability – extreme earthquakes in 2010

The Haiti earthquake on 12 January 2010 of magnitude 7.0 Mw (moment magnitude scale) was associated with over 230,000 deaths, whereas of seven other seismic events during 2010 of equivalent or greater magnitude only two reported deaths in excess of 30 persons. The 27 February 2010 Chile earthquake, Mw8.8, and so more than 30 times as extreme, resulted in only 486 reported deaths but massive structural damage. The Sumatra earthquake and tsunami on 25 October (Mw 7.7) resulted in 435 reported fatalities with over 100 persons missing and also with extensive damage. There were three recorded extreme earthquakes (Mw  $\geq 7.0$ ) in less densely settled New Britain (Papua New Guinea) without reported loss of life. These contrasting outcomes highlight the vulnerability of Haiti to natural hazards, including tropical storms, drought and seismic events. This extreme vulnerability is associated with high *exposure* of people and assets linked to poverty and poor governance. There is lack of

<sup>4</sup> To avoid possible confusion we follow Newberry and Stiglitz's widely accepted distinction although Anton prefers to refer to systematic risks and non-systematic risks.

preparedness and investment in prevention, as well as a failure to regulate land use or ensure construction standards in public and private sectors. Nor when a disaster strikes are *impacts* minimised by effective response, as demonstrated by the cholera epidemic of 2010. These failures contrast with successes in risk reduction in neighbouring Cuba and the Dominican Republic.

Stirling (1999, 2007) proposes that aggregated risks derived from the probability or likelihood of events and the outcomes, whether characterised as magnitude or impacts, may be understood in terms of four logical permutations possible of incomplete knowledge that typically occur in the real world: the formal condition of risk, uncertainty, incertitude and ignorance. The assessment is explicitly not 'objective' as it reflects the subjective weighting of evidence by the analyst or analysts in the case of an expert elicitation.

The implications of using this framework for the management of natural disaster risks are illustrated in Table 1 with four widely reported and discussed natural hazards that affect the case study countries, as well as a global food price spike. Using this open framework others may assess these risks differently. After the 26 December 2004 Tsunami both the probability and likely outcomes of a future event are widely accepted to be well characterised, a formal condition of risk. These *quantifiable risks* provide the basis for investments in technical early warning systems, the preparatory organisation for rapid evacuation, regulation on coastal land use and investments in coastal defences to mitigate impacts. These risks are also amenable to statistical modelling of probabilities and cost-benefit analysis.

In contrast, Malawi prior to the food crisis in 2001-2 exemplifies Stirling's condition of *ambiguity*. The extent of the vulnerability of the rural population to climatic variability had not been fully appreciated. Furthermore the complex ways in which adverse weather and hydrological conditions were affecting agriculture were not well understood. In consequence, preparations for, and initial responses to, the perceived nature of the emerging crisis were not just inadequate, but worsened the food security situation.<sup>5</sup>

A condition of *uncertainty* exists for tropical storms in the Bay of Bengal: risk assessment based on historical data may underestimate the likelihood of extreme events as climate change is anticipated to increase their frequency. Recent meteorological research also shows that the spatial extent and duration of storms need to be included in any risk assessment as well as maximum wind speeds, the only indicator accurately recorded before satellite imaging (e.g. Emmanuel, 2005). Consequently data prior to 1980 also provide a less precise record of the destructive potential of extreme storms.

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<sup>5</sup> See Devereux (2002) and Stephen Carr in evidence to the IDC, 2003 and further discussion in Section 5 and Annex C.

**Table 1: Incomplete knowledge and policy: selected natural hazards and case study countries**

		Knowledge about outcomes	
		←-----→	
		Outcomes well characterized	Outcomes poorly characterized
Knowledge about likelihoods	Firm basis for probabilities	<b>Risk</b> E.g. Indian Ocean Tsunami post Dec 2004	<b>Ambiguity</b> E.g. Climatic variability and Food Crises in Malawi: 2001-2002
	No firm basis for probabilities	<b>Uncertainty</b> E.g. Extreme Tropical storms in Bay of Bengal under climate change  Global Food Price Spike (GFPS) in 2010/11 or 2011/12	<b>Ignorance</b> We don't know what we don't know?  E.g. Joint risk of coincident global food price spike and extreme regional drought (Burkina Faso, Mali and Niger)

**Source:** Based on Sterling 1999

**Note:** Sterling's four cell Matrix: distinguishes situations of risk, ambiguity, uncertainty and ignorance.) The area in the middle of the table at the intersection of the cells is *the area of incertitude*, where assertions by scientists, interests groups, and political actors take place.

There is a lack of consensus on the relative significance of different influences in causing the 2007-8 GFPS, and evident difficulties in interpreting price volatility in 2010. This suggests that for the immediate future, in 2011/12 and 2012/13, the behaviour of volatile markets is uncertain. Nevertheless, the extensive review of the impact of and responses to the 2007-8 spike imply that at this moment the potential *outcomes* of another spike are relatively well understood. However, if, for example, one assumes learning on the part of key actors in some of the affected markets, then the way a global spike might occur and the degree of transmission across markets could be said to be *less predictable*.

Stirling starkly characterises the combination of uncertainty and highly ambiguous outcomes as *ignorance*. The joint risk of a coincident prolonged regional drought in the Sahel (c.f. 1972-74 and 1982-84) and a GFPS (1973/4; 1995/6; 2007/8 and 2010/11) would appear from historical data to be very low. However, there is uncertainty regarding the likelihood of either event; and because of extreme El Niño teleconnections there is possible global covariance. A regional drought in 1972-74 coincided with an extreme El Niño event that adversely affected southern hemisphere exporters. Precisely how a crisis would be transmitted through a West African regional economy that is more integrated than three decades ago is also extremely problematic.

The acknowledgement of 'ignorance' implies a move from a condition of 'unknown unknowns' to 'known unknowns'. Stirling suggests a menu of five responses to *ignorance* including:

- targeted research and horizon scanning;
- trans-disciplinary and institutional learning;
- open-ended surveillance and monitoring;
- re-examining evidentiary presumptions: e.g. ubiquity, persistence
- adaptive management, stressing flexibility, diversity and resilience.

Scenario building for national and international food security, for example in terms of *what if there were an extreme El Niño event in 2012-13*, would seem worthwhile and not simply alarmist.<sup>6</sup> These ambiguities and uncertainties justify the development of disaster risk management strategies, including contingency planning in terms of layers of risk. There are further exploratory analysis using Stirling's matrix for a widely recognised major hazard and food price spikes in Bangladesh (Table 4), Malawi (Table 15) and Niger (Table 22).

## 2.4 A layered approach to risk management

Are the economic rational choice model and the precautionary science policy model of incomplete knowledge incompatible as ways of framing risk policy?

Alternatively is it possible and indeed preferable to articulate an explicitly pragmatic and open approach to risk management by treating *unsystemic* risk and risk in conditions of incomplete knowledge as broadly equivalent? A recognition of the incomplete understanding of complex systems and the pervasiveness of unsystemic risk under climate change or more broadly - rapid global environmental and social economic transformations leads some economists, such as Anton (OECD, 2009) for agriculture and Benson and Clay (2004) for natural hazards more generally, to propose a layered approach to the management of broad bands of aggregated risks.

A layered approach allows for the articulation of strategies that are explicitly context specific in the use of different tools for reducing *aggregated risk*. The specification includes forms of hazard or risk source, countries characterised in terms of physical environment, economic structures, governance and the time horizons for planning – the immediate future or longer term. The approach adopted in this exploratory investigation is to layer risk in terms of broad probability bands based on *recent historical data*:

- *High risk* events with annual probabilities of occurrence of greater or equal to 1 in 10 ( **$P \geq 0.1$** ) which require contingency planning by or on behalf of vulnerable individuals, groups and economies. These risks are widely regarded as inherently uninsurable through commercial insurance. Examples are extreme riverine flooding in Bangladesh (6 events in 40 years) and climate related food crises in Malawi and Niger which have occurred twice in both countries in a decade.
- *Medium risk* with annual probabilities in the range:  **$0.02 < P < 0.1$**  or less than 1 in 10 and more than 1 in 50. This layer is the most contentious area meriting close review because many perceive risk transfer to be commercially viable. Specific examples apparently in this layer are droughts in Bangladesh or regional multi-year drought in the Sahel (twice since 1970) but the implied risk may be problematic because of uncertainty resulting from technical innovation and under climate change (e.g. Hulme, 2010).
- *Low catastrophic risks* ( **$P \leq 0.02$** ). Possible examples are extreme earthquakes in Bangladesh or Malawi. The estimated joint probability of a global food price spike

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<sup>6</sup> Oceanographic modelling indicates a significant likelihood of event by mid 2012 of 25%. See IRI assembly of models e.g. The International Research Institute for Climate and Society monthly ENSO forecast is available at <http://iri.columbia.edu/climate/forecast/ENSO>. The probability of such an El Niño event has been steadily increasing in the course of drafting this report from low to a substantial risk.

coinciding with a medium risk event such as a multi-year regional drought in SSA derived from historical data is apparently low. However, in the light of uncertainty about both the effects of climatic change and the other factors that could cause a spike and possible covariance, the numbers in that case are even less robust (Table 1).

The layered framework is open, in that boundaries can be easily redrawn in a specific context and particular risks moved between layers. The layered approach also provides a rational basis for the adoption of different instruments or tools to address particular risks, for example according to Galtier's (2009) categorisation for managing food price instability (see below Section 2.5 and Table 2).

Anton (OECD, 2009) in considering agricultural risk management, for production and incomes of producers, proposes a template for layered risk management in terms of instruments:

- High risk events: Normal/ retained risks;
- Medium risks: Insurance/ marketable risk; and
- Catastrophic risks.

These layers of risk may apply to the individual actor or be an issue of public risk at sectoral or national level requiring public action. Similarly a systemic catastrophic risk will likely require international public action to assist a LIC such as those included in this study. These widely recognised natural hazard risks in Bangladesh, Malawi and Niger are categorised and discussed within a layered framework (Tables 4, 6, 8).

Global food price spikes which impact on poverty and economic development through both consumption and production risks appear unsystematic. Consequently such a classification of layers of risk with specific instruments may not be directly transferable to risk management for food security crises and global commodity price shocks. These are empirical issues, which we explore through case studies purposively selected to take into account evidence from 2007-8 onwards on transmission of price volatility to a country level.

## 2.5 Instruments for management of Price instability

Galtier (2009) provides a useful categorisation of the ways in which these issues of food price volatility are typically addressed. Galtier classifies public interventions or instruments according to their broad objective:

- To stabilise domestic prices, i.e. reduce or limit volatility
- To reduce the effects of volatility

and also by the mode of governance – indirectly market based or direct public action in an ABCD Matrix (Table 2).

Galtier works, as do most agricultural economists, with a model of market dynamics in which the conditions for equilibrium are assumed to exist. Then there is price volatility which can result from exogenous shocks such as an El Nino event, and endogenous instability that can stem speculative bubbles, panic movements, cob-webs and so forth. The issues to be addressed are what forms of intervention will *stabilise* incomes, production and consumption.

**Table 2: The different categories of price instability management instruments**

Objective	Stabilise prices	Reduce effects of price instability
Governance		
Market-based	Category A	Category B
Public	Category C	Category D

**Source:** Galtier, 2009

Category A (or A-instruments) are intended to facilitate the spatial and temporal arbitrage undertaken by market actors (producers, traders, consumers). They essentially refer to the cereals markets and concern both infrastructure (transport, communication and storage) and market institutions (such as the existence of grades and standards, warehouse receipt systems or exchanges facilitating the aggregation and the clearing of supply and demand). The main idea of A-instruments is that the arbitrage of market actors leads to the homogenisation of prices over time and space (as far as storage and transport costs permit), in theory reducing the level of instability.

B-instruments are also market-based instruments. The aim of these tools is to prevent price instability from causing income instability (which could in turn affect consumption and production). In practical terms, this means enabling economic actors to cover themselves against the risks linked to price variations (forward contracts, futures, put options, and call options) and harvest variations (crop insurance, weather index insurance).

C-instruments are public intervention tools aimed at ensuring that the price does not exceed certain limits. Depending on the case, the tools may include floor prices, ceiling prices or price bands. C-instruments concern production controls, border controls or stock controls. They include instruments as varied as input subsidies, import and export taxes and subsidies (fixed or variable), quotas, prohibitions or public buffer stocks.

D-instruments are public intervention tools aimed at supporting household incomes when prices are high. They involve transfers, generally restricted to certain categories of poor or vulnerable households (targeting). The instruments may vary according to the type of good transferred (money, vouchers, food or even inputs), the level of cost coverage (donations or simple subsidies as in the case of sales at moderate prices) and whether or not a counterpart (typically labour) is required in return for the transfer.

Interventions can also be classified in terms of levels of public action – international, macro or economy-wide or targeted to specific areas (regions, provinces) or groups, and this is recognised in the country case analysis. The organisation of public action can be through a combination of government, civil society and international action. The relevance of an intervention requires an explicit statement in political economic terms of the public interest in that context and regards the applicability of any of the forms of interventions according to these circumstances. This openness is compatible with the country and context specific approach adopted here to assessing and managing hazard risks.



### 3 Analysing global price volatility at a country level

In this section we propose a fivefold categorisation of countries in terms of vulnerability to a global food price spike and two selected for case study examination. Five countries are purposively chosen: Bangladesh, Malawi and in the West African Sahel, Burkina Faso, Mali and Niger. The high levels of food price volatility, but which follow different patterns, suggest for each case context specific combination of inter-connections between country, regional and global markets.

#### 3.1 Issues for analysis

There is an already large and still growing literature on the 2007-8 food price spike. This paper draws purposively in particular on four sources: Timmer's (1986) classic guide to agricultural price policy, the earlier investigations under the ODI programme (Wiggins et al, 2010a; 2010b), as well as Galtier's (2009) and Abbott's (2010) analytical reviews to provide the framework for this analysis.

The Haiti earthquake in January 2010 and the Pakistan floods in August 2010 exemplify extreme natural disasters as internal and exogenous shocks that impact *directly* on livelihoods and food security and the development trajectory of the economy, both through destruction of assets and the loss of domestic product and incomes (Benson and Clay, 2004).

From an international policy perspective it would be useful now to distinguish countries in terms of the way they were impacted in 2007/8 and are now vulnerable to another GFPS which is an *external* exogenous shock that is transmitted through prices and markets. A provisional attempt at such a categorisation is set out in Section 3.2.

The second issue explored here is the joint probability of a coincident GFPS and an extreme disaster. One way of considering integrating GFPS into risk management would be the joint probability of a spike occurring in conjunction with such a shock. This has happened twice in Bangladesh since independence in 1971. The first joint shock, which involved the cumulative effects of drought in 1972-3 and then extreme flood of 1974 in an immediate post-conflict situation and coincident global food crisis, was catastrophic – resulting in famine and hyperinflation. The second shock was in 2007 when there were extreme floods in July and then a severe cyclone (hurricane) cum storm surge in December (Table 3). The crisis was amplified by the coincident spike in rice and wheat prices. The livelihood-food insecurity crisis was severe but contained. Is and should Bangladesh explicitly prepare for another such combination of shocks?

Climate variability impacts on agriculture, including food production and is associated with seasonal and inter-annual volatility in food markets and depending on the extent of vulnerability. Where there is extreme vulnerability then any departure from favourable growing conditions can result in a disastrous food crisis as in Malawi in 2001/2 or Niger in 2006. Again the food crisis can be exacerbated by a GFPS, as during the Sahel regional multi-year drought in 1972-74. However subsequent regional droughts in 1982-4 in the Sahel and in 1991/2 in southern Africa occurred when global cereal markets were overhung with surpluses in exporting countries. The effects of these crises were contained by large scale food aid and commercial imports.

### 3.2 Categorisation of countries in terms of import parity prices (MPP) and export parity prices (XPP)

Retrospective assessments of the 2007-8 GFPS (e.g. Wiggins et al 2010a; Abbott, 2010) suggest the usefulness of making a broad five-fold categorisation of countries based on the relationships between international prices and domestic prices for tradable staple cereals in terms of import (MPP) and export parities (XPP). These relationships, which reflect both structural features of the domestic food economy and agricultural policy, have determined the extent of transmission of international market volatility into the domestic food economy. The illustrative examples are from the regional economies from which the four case study countries are taken.

*A. Countries where pre-shock domestic prices are typically above international prices*, because the domestic market and production are insulated from external variability by some combination of trade barriers and domestic agricultural policy. Examples amongst the Asian rice economies are China, India, Indonesia and Malaysia, as well as Japan and South Korea.

*B. Food exporting economies with pre-shock domestic prices equivalent to export parity prices* that is established by international prices. Amongst Asian rice economies are Thailand and Vietnam. South Africa is in this position for white maize in SSA.

*C. Economies in structural food deficit and intermittent food importers with domestic wholesale prices close to import parity levels.* However transaction costs preclude exports (e.g. Bangladesh and Philippines for rice).

*D. Countries with domestic prices fluctuating within a wide band between import parity and export parity prices.* Both recorded cereal imports and exports are intermittent, often officially funded including food aid. The wide difference between XPP and MPP reflects high transport costs in importing and additionally high transaction costs in exporting to international markets. Malawi is an example.

Intra-regional trade is a complicating factor, for example in both West and Southern Africa. The position of landlocked Sahelian economies is less clear because there is considerable intra-regional trade in some commodities (e.g. millets), whilst high transport costs contribute to the considerable wedge between the international prices of widely traded cereals such as maize and rice and the domestic market. There is active regional trade in Southern Africa, for example between Malawi and neighbouring Mozambique.

These different food trade situations partially reflect underlying factors such as sensitivity of rainfed agriculture to climate and transport costs as well as the context specific influences including public policy. There is unlikely to be a one size fits all set of domestic policy prescriptions.

Category C and D economies exemplify the concept of sensitivity to international price volatility and forex constraints on imports underlying FAO's category of a least developed food deficit country (LD-FDCs) which, in including all foodstuffs, is perhaps a too inclusive a classification to provide a basis for international policy dialogue.

A fifth category 'E', not considered further here, are countries in conflict or just emerging from conflict, such as Afghanistan, Sierra Leone and Somalia, which are highly dependent on 'official' imports organised as food aid or through budgetary support. These countries are self-evidently extremely vulnerable to any threat to imports. Food aid is also partially procyclical (see below Section 7.4). However, the abnormal political economic constraints preclude a risk based framework of analysis such as explored here (see Wiggins, Keats and Clay, 2010).

### 3.3 Impacts of 2007-8 spike on cereals prices in case study countries

Abbott (2010) considers the effects of the 2007-08 shock for a series of exemplary cases in detail, including three of the four countries selected for consideration in this paper

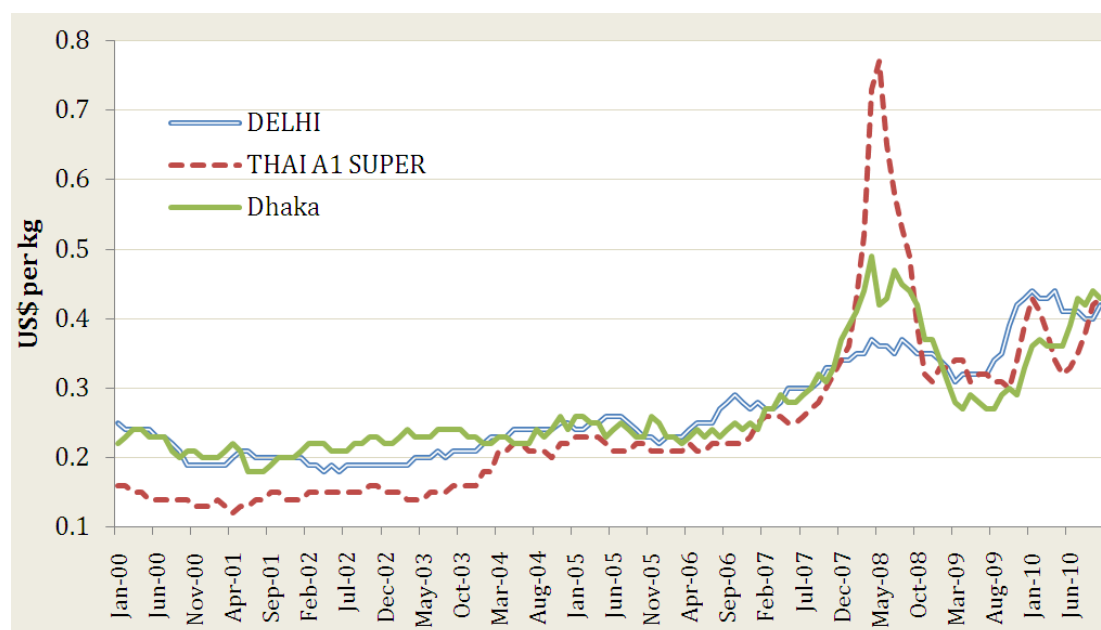


(Bangladesh, Malawi and Mali), and his findings are largely consistent with the above categorisation of country situations.

#### Rice and Bangladesh:

The broad differences in the transmission of global influences interacting with country specific conjunctural and policy influences is illustrated for rice prices in India, Thailand and Bangladesh (Figure 2)

**Figure 2: Bangladesh and International Rice Prices from Jan 2000 to Oct 2010, converted to US\$**



**Source** GIEWS

Up to 2007 Bangladesh prices closely track those in neighbouring India from where there were regular imports. Indian and Bangladesh prices were substantially above international, Thai export prices for low grade rice. In response to surging global food prices the Indian government embargoes exports from 9 October 2007. The effect is to partially insulate the Indian market from the GFPS. Nonetheless there is some observable transmission of or synchronising with global volatility which is difficult to explain apart from precautionary hedging and speculative sentiment.<sup>7</sup>

In Bangladesh where there is a disaster related food crisis and low public stocks rice prices surge upwards in response to the spike, and more restricted opportunities for imports. The increase is 79% between January 2007 and April 2008. There were more severe impacts of the combined disaster related crisis and effects of the spike on the poor and nutritionally vulnerable (Wiggins, Compton and Keats, 2010a). Then the large surge in domestic rice production in the post-disaster irrigated *Boro* rice crop was the major factor in bringing domestic prices down below Thai and Indian price levels in 2009.<sup>8</sup>

The ways in which food prices have behaved during and immediately after extreme flood years has been a powerful influence on disaster risk reduction and food security policies in Bangladesh. In contrast to 2007/8 following the extreme floods in 1998 price rises were

<sup>7</sup> Indian prices continued to rise in an unseasonal way up to April 2008 despite a good harvest in 2007/8 only falling away with the collapse in international (Thai export prices) after May 2008. There is a similar effect of intervention in reducing the sensitivity of the domestic wheat market to global volatility (see Annex B Figure 8 and 11).

<sup>8</sup> The extent to which Bangladesh prices departed from the close association with neighbouring Indian prices in 2007-08 is a sensitive issue. In effect by its actions India was insulating its market and amplifying the effects of volatility on disaster affected consumers in the neighbouring economy. Some indication of this effect is suggested in Section 4 Figure 6

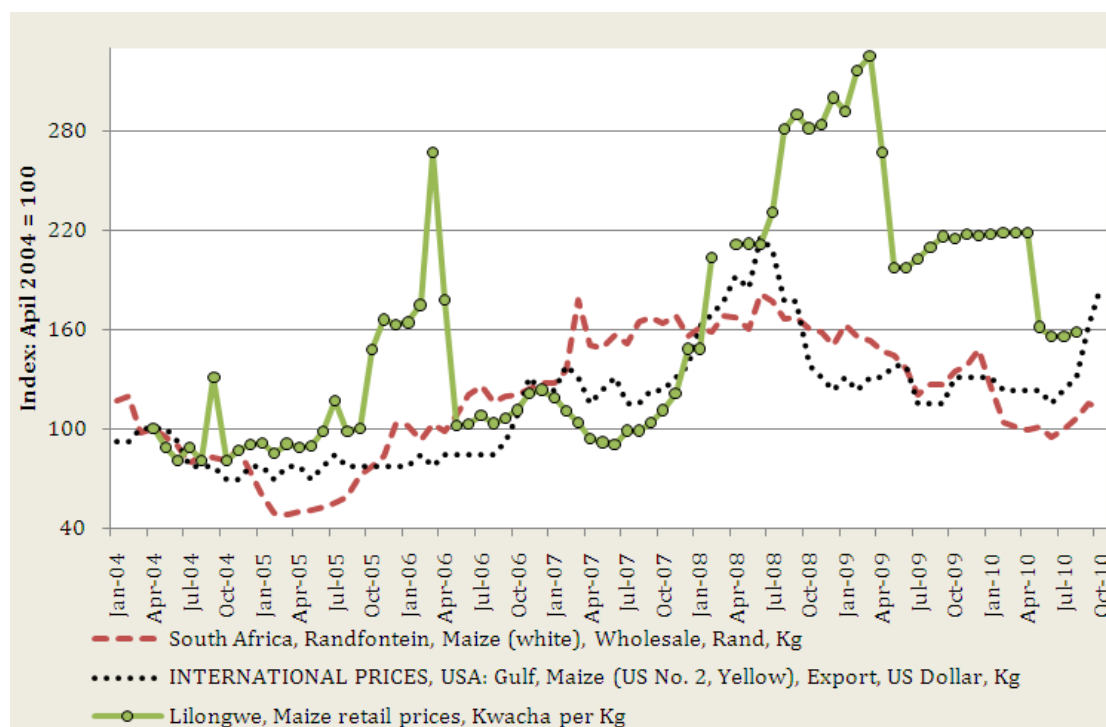
contained by a surge in commercial imports after restrictions were lifted. This import surge was even before large scale programme food aid and the post-flood response in domestic production took effect (del Ninno *et al*, 2001). Then the way the food supply and potential price effects of the 2000 floods in the south west and the more general floods of 2004 were contained by imports encouraged the view that disaster shocks should be managed in a relatively open trade regime with importing by government and increasingly the private sector. These contrasting crises highlight the potentially severe effects of a coincident disaster and price spike, the partially forgotten lesson of the 1974 famine, as discussed further in Section 4.

### Maize and Malawi

The contrasting behaviour of US exports, South African and Malawi prices for maize illustrates a different and more complex market for a commodity with multiple uses in human consumption, and as an intermediate good in the livestock sector, and more recently for ethanol production (Figure 3). Historically US production, stocks and so export prices are the dominant influence establishing the international market price for yellow maize. South African white maize has commanded a price premium because of demand for human consumption in SSA, including officially funded food aid. Malawi's thin market is extremely volatile, largely reflecting internal conditions rather than the global market. The transmission of international price movements has there been limited and an unimportant influence on maize prices during 2007-2009 (Figure 12 and Table 14).

The shift upward in US maize prices relative to South African prices since 2007 is consistent with the widely assumed influence of the US government measures that encouraged growth in demand for ethanol production. The relative lack of integration of Southern African white maize trade with the ethanol economy and rapidly growing demand from animal feed markets in emerging economies has implications for the transmission of global price volatility. The regional demand for white maize exports has been limited by the high prices. Then prices and support to producers in importing countries are probably both contributing to relatively good harvests in 2008 and 2009, e.g. in Malawi. Many South African farmers found maize prices to be loss making in 2009-10.

**Figure 3: Maize Prices Indices - Malawi, South Africa and US Export Prices (April 2004 = 100):**



**Source:** GIEWS; FEWS

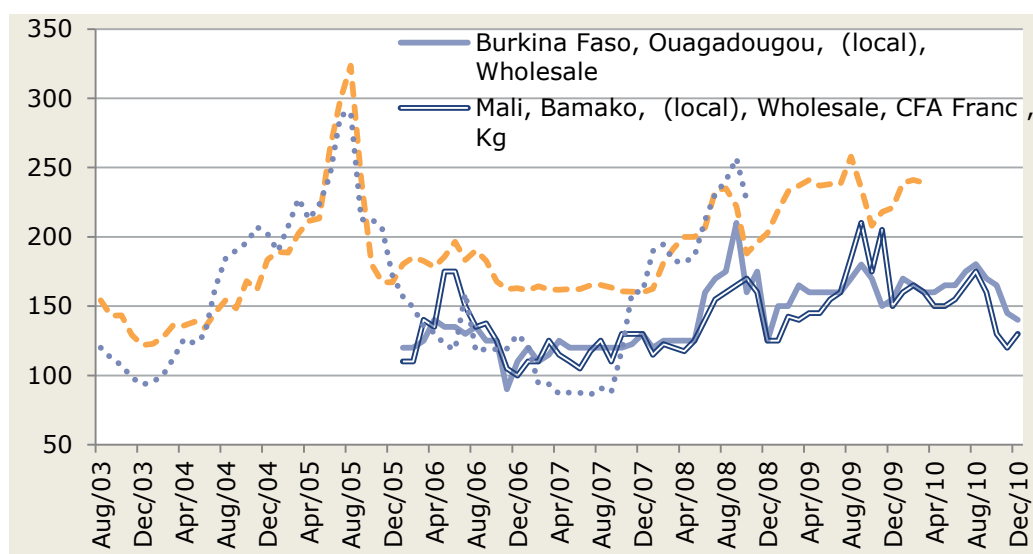
In Malawi domestic prices are extremely volatile, more so than international markets (Figure 3). Recent spikes in 2005/6 and 2008/9 strongly reflect the influence of weather on production, perhaps amplified by weak public stock management, on a thin market. There are limited legal export and import possibilities, because of high transport costs and the financial risk attached to delays in delivery. The strong climate-related variability in southern African cereals and the exposed position of South Africa as supplier of last resort highlight the need for considering how better to address the management of food security risks and related costs at regional level.

### Cereals and the Sahel

The internal markets in Burkina Faso Mali and Niger for millet and other coarse grains, which are not traded outside the region, show some sensitivity to global volatility (Figure 4).<sup>9</sup> The anticipated and realised harvests in 2008 were exceptional Burkina Faso relatively good. Nevertheless intra-seasonal variation was more extreme than in previous years. There has been a considerable growth in intra-regional trade facilitated by a common currency in the CFA Franc zone and also with other coastal states, predominantly Nigeria, whose oil revenues can fund a massive structural deficit in food. Nigeria can influence strongly both import and export prospects for Niger.

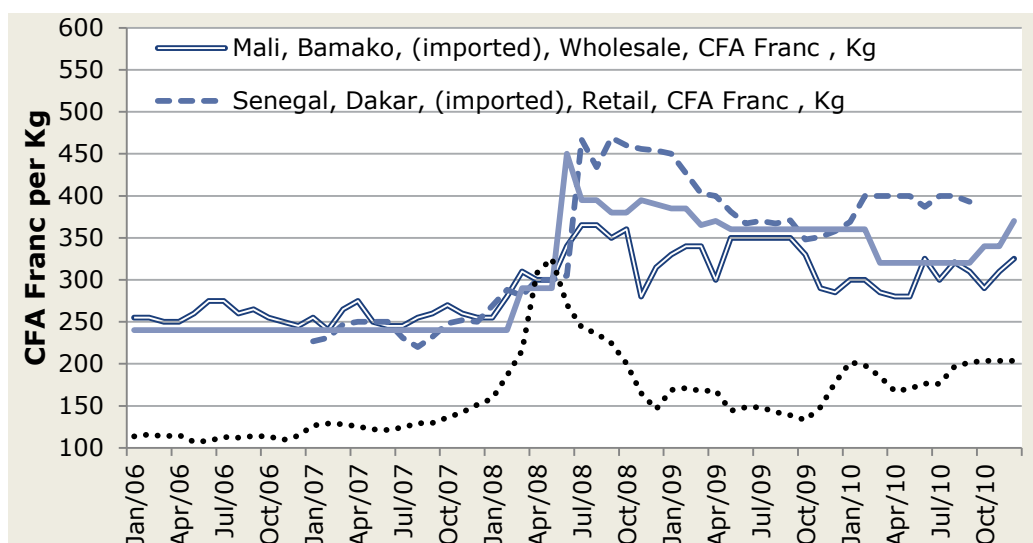
As Abbott (2010) suggests the relationships with global markets are complex and often indirect through commodities that are partial substitutes in consumption and inter-linked different local markets. This is confirmed by a comparison of millet and rice prices in Burkina Faso, Mali and Niger with major regional markets, respectively Nigeria for coarse grains and Senegal for rice, as well as with international prices (Figure 5). There is a clear correlation of prices for regionally and internationally traded rice. There also appears some price interlinkage between regionally traded millet and internationally traded maize, but the correlation is weak (see Annex D).

**Figure 4: Millet Prices in Burkina Faso, Mali and Niger and Nigeria in CFA Francs (2003-2010)**



**Source:** Constructed with data from FAO GIEWS

<sup>9</sup> The analysis in this section focuses on the contrasting behaviour of millet and rice but in Annex D the analysis is extended to include sorghum and maize

**Figure 5: Rice prices: Burkina Faso, Mali, Senegal and Bangkok, 2006-2010**

**Source:** Constructed with data from FAO GIEWS

**Table 3: Basic cereals in case study countries: correlation coefficients for month prices as indicator of regional and international market linkages.**

Commodity	Regional	International	Regional/International
Millet	Kano		
Bamako	0.47		
Niamey	0.70		
Ouagadougou	0.65		
Bamako/Niamey	(0.71)		
Bamako/ Ouagadougou	(0.79)		
Maize	Kano	US Gulf	Kano/US
Niamey	0.64	0.29	-0.07
Maize	S.A		SA/US
Lilongwe	0.40	0.63	0.80
Rice	Dakar	Thai (90 day)	Dakar/Thai (90 day)
Bamako	0.77	0.74	0.79
Ouagadougou	0.88	0.80	
Bamako/Ouagadougou	(0.87)		
Rice	Delhi	Thai	Delhi/Thai
Dhaka	0.93	0.96	0.94
Wheat	Delhi	US	Delhi/US
Dhaka	0.89	0.92	0.90

**Source:** Tables in Annex B, C and D.

**Note:** The correlations for rice between ex Bangkok and West African centres are lagged 90 days. The period of coverage is 2000-10 for Dhaka (Bangladesh), 2004-10 for Lilongwe (Malawi) and variously 2003-2010 for millets and 2006-10 for rice in West African economies (See Figures 2-5).

The covariance between domestic markets in the case study countries, regional markets and international markets are illustrated in terms of correlation coefficients for capital city monthly prices during recent years (Table 3). There is a striking contrast. Bangladesh and neighbouring Indian prices which are more closely correlated with global rice and wheat markets, although India has been more successful in limiting sensitivity of domestic markets to international volatility. The regional and international market linkages are more complex and commodity specific for Malawi as well as Burkina Faso, Mali and Niger. In West Africa intra-regional interconnections for coarse grains are more pronounced than those with international markets. In contrast, the strong correlations between prices for widely traded rice between Bangkok and West African centres is suggestive of a causal connection

To summarise, in all these countries there is *some* observable domestic market sensitivity to global price volatility. The reasons for that sensitivity are not in every case obviously explicable in terms of interlinkages between domestic and international markets. Although it finds no place in neo-classical price theory, speculative sentiments, or animal spirits may have played a role. Imported cereals, rice and wheat (although only important in urban consumption) as well as input and fuel prices were all rising in 2007/8. The partial transmission of the global spike in 2007-8 to domestic markets in all cases had implications in terms of market instability. The price rises also intensify food insecurity amongst poor urban and rural consumers and farming households that are only partially meeting their own staple food requirements and are seasonally in deficit. The additional stresses upon the nutritionally vulnerable are a further source of concern.

## 4 Uncertainty and Risk Frameworks: Bangladesh

In this section we consider how global food price volatility has become a major policy issue for Bangladesh. We look at how price spikes relate to the management of other natural hazard risks and the available instruments to mitigate the effects of food price volatility on poverty. A combination of a layered approach to risk management and Galtier's categories of intervention provides the analytic structure for this review. There is further supporting analysis in Annex C.

### 4.1 The Price Spike and after

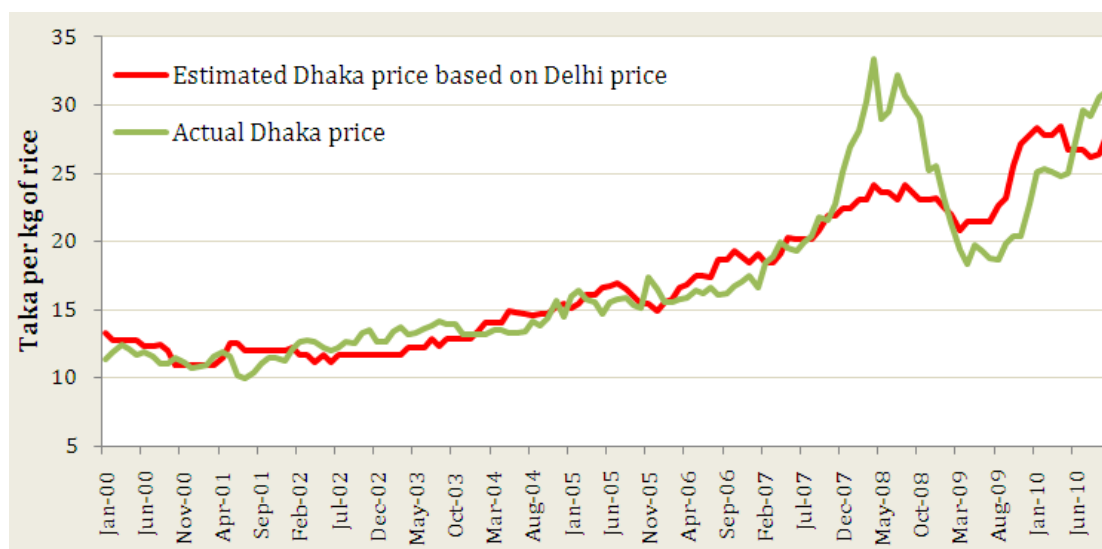
Bangladesh is extremely vulnerable to multiple natural hazards, as well as economic shocks, such as from fuel and food price spikes. As the 2007/8 price spike showed, global food price volatility is a major issue for a country which is a net importer of rice, wheat and other basic foodstuffs, and in which domestic prices are closely linked to international markets. The price rise impacted especially on the poor: the percentage of people in poverty, which had fallen from 49% in 2000 to 40% in 2005, rose to 42% in 2006/7, and to 46% in 2007/8 (World Bank, 2008). Those in extreme poverty were worst impacted, with severe negative effects on nutrition and child development.

The 2007/8 spike also initiated a period of extreme domestic price volatility, which continues. In 2008/9, with a surge in production and higher imports, there was a precipitate fall in rice prices. Subsequently there has been an abrupt reversal with wholesale rice prices in the year to 2<sup>nd</sup> December 2010 increasing by 52%. These sharp reversals in prices have severe impacts on real incomes, especially of poorer consumers. This cobweb-like volatility also makes more uncertain the position of agricultural producers, especially those more at risk to flood and storm damage.

Domestic-international price linkages are clear from a comparison of the behaviour of internal prices for rice with that of the common sources of imports since 2000 - India and Thailand for rice (Figure 2, as discussed in Section 3.3). This is also true for the wheat price and US exports of wheat. A more detailed analysis is presented in Appendix B.

*What is happening in 2010/11?* There is a potential crisis situation. In December-January rice prices would be expected to fall with the *Aman* (main monsoon) harvest, but in early December prices were around 50% above those of 12 months previously. Prices, 27% above those in Kolkata, were well above the levels that would be predicted on the basis of well-established links to global markets. (Figure 6 and Figure 9). There is uncertainty about global markets too. From a Bangladesh perspective these uncertainties underscore the high level of risk with regard to global food price volatility and coincident domestic supply weakness. Neither government nor the private sector hold substantial levels of stocks compared with the annual volumes of food grain operations or marketed rice and wheat. The domestic policy cycle appears to be amplifying the effects of international volatility.

**Figure 6: Regression Estimate of monthly Dhaka prices based on Delhi prices; Jan 2000 - Oct 2010**



**Source:** See Annex B Figure 10

## 4.2 Disaster risks: a layered approach

How can price volatility be incorporated into wider disaster risk management? Most recent assessments draw attention to the limitations of estimating risks from historical data on the assumption that these risks are stationary. There is no attempt to quantify risks in the National Disaster Reduction Strategy. The problematic of natural hazard risks is illustrated in Table 12 in the form of a Stirling matrix of incomplete knowledge for extreme cyclones and global food price spikes. There is comparable uncertainty regarding other major natural disaster risks, extreme monsoon river flooding, drought, an earthquakes and an extreme tsunamis. This uncertainty provides the rationale for considering different potential hazard threats in terms of layers of risk.

An exploratory assessment for Bangladesh based on the historical incidence of what are widely agreed to have been extreme, systemic events indicates that extreme monsoon (river) flooding, intense tropical cyclones with storm surges and also exogenous GFPS are all high risks (Table 4). There is even higher likelihood of localised covariant risk, e.g. flash floods and erosion occurring on an annual basis. Drought risk is much diminished, and with the localised effects of climate change, also extremely uncertain.

Where both probabilities and outcomes are imprecisely understood, this is further justification for categorising flood, cyclone hazard and price shocks as high risk and adopting a precautionary approach to managing these risks. *The 'precaution' is to assume the actual risks are not less than the estimated values based solely on available quantifiable information* (Stirling, 2007; Dorman, 2005).

High risk categorisations imply that such events require a constant level of preparedness and a capacity on the part of all that are potentially affected - individuals, groups and the nation state - to minimise impacts. This in turn implies those potentially affected having capacity or enabling those economic actors to enhance capacity to cope with variability on a normalised basis, and to internalise risks through self-insurance. The focus of public action should be first to assist decentralised absorption of such risks, enabling in particular poor people and those threatened with poverty to continue to participate in economic development. This could include any of the categories of action identified by Galtier (Table 2). Second, public action should include ensuring a continuing capacity on the part of government and civil society to engage in both anticipatory mitigation and additional responsive measures as required.



**Table 4: Bangladesh - National (Systemic) Disaster And Food Spike Risks**

Annual probability (layer of risk)	National (Systemic) Shock	Comments
High risk $P \geq 0.1$	a. Extreme River or Monsoon Floods:  1974, 1987, 1988, 1998, 2004, 2007	NDMP (2010) also lists 1954, 1955, 1970 and 2000 floods; excluding these events  Implied Annual P (1971-2010) = 0.15
	b. Extreme Cyclone and Storm Surge:  1965 (2); 1966; 1970; 1985; 1991; 2007	NDMP (2010) lists these as 'devastating' cyclones  Implied Annual P (1961-2010) = 0.16
	c. Global Food Price Spike (GFPS):  1973/4; 1995/6; 2007/8; 2010/11 (?)	Implied Annual P (1971-2010) = 0.1
Medium risk $0.02 < P < 0.1$	d. Drought:  1972/3; 1979/80	NDMP (2010), which also lists 1951, 1957, 1958, 1961 and 1966, comments that events since 1979 'only affected monsoon season'. Annual P (1971-2010) = 0.05 is in doubt because of spread of irrigation since 1980
	e. Coincident GFPS and Extreme National Disaster:  - 1973/4: Drought in 1972/3 and Flood in 1974;  - 2007/8: Flood and Cyclone in 2007	The implied annual probability is uncertain but at least equal, assuming independence of each type of shock, to the joint probability of a GFPS (shock c) and one of the other high or medium risks, flood (a), cyclone (b) and drought (d):  $P_e \geq P_c(P_a + P_b + P_d) = 0.036$
Low risk $P \leq 0.02$	f. Catastrophic earthquake:  c.f. Meghalaya Earthquake in 1897; Assam 1950	Risks are low, but possibly non-stationary – increasing with elapsed time since last extreme shock
	g. Extreme Tsunami	Ditto

**Source:** Based on NDMP (Bangladesh, 2010)



The argument against a precautionary approach is that it is more costly than rational choices based on 'expected values'. There is a difficult problem of striking a balance between increasingly costly measures to minimise negative outcomes and sustainable levels of public expenditure. This is especially so in a low income country when part of internalising risk may include establishing contingency reserves, the financing of food security stocks or stockpiles of material for disaster response. That tension suggests adding macroeconomic level measures to the range of public interventions suggested by Galtier (2009).

### 4.3 Risk frameworks: floods and food price spikes

Does the management of exogenous food price shocks require a special and separate framework for risk minimisation? Alternatively, can price shocks be broadly accommodated within the existing framework for high risk hazards? Bangladesh is an especially important case because, as a populous, low income country (poverty head count 56 million in 2005), it is demonstrably sensitive to international price volatility. Bangladesh is also widely regarded as having become more successful in limiting the social and economic impacts of such natural disasters, especially extreme monsoon flooding and tropical cyclones, whilst sustaining growth and poverty reduction since the 1991 cyclone and the restoration of multi-party democratic government. To initiate an exploration of this potentially complex issue for the case study countries, the analysis is simplified to compare the management of monsoon flood, arguably the more systemic of higher risk hazards, with the additional response to the 2007/8 spike. Again, to simplify the exploratory analysis the focus is more on rural poverty reduction, in part because urban poverty is still less closely monitored.

The wide range of public actions that are recognised as contributing to reducing extreme flood risks can be organised in terms of four categories broadly equivalent to those proposed by Galtier for reducing food price instability. These actions are compared in Table 5 with those that would be appropriate to addressing a food price shock.

*Category A* measures aim to facilitate normalisation of outcomes and enable those potentially affected to retain risks.

*Flood risk:* Information about risks and impending threat is a necessary condition for rational decentralised decisions. The provision of information as a public good has made considerable progress. The Directorate of Disaster Management provides daily alerts on river level status, and these are widely disseminated with the spread of IT networks and broadcast media. Decentralised responses include the organising activities of NGOs and local governments and not just individual actions. The much lower reported fatalities from the extreme monsoon floods in 2004 and 2007 than in previous extreme floods suggest that people are better informed of impending threats, and early warnings and their wide dissemination have been increasingly effective. However, flood forecasting is constrained by limited regional co-operation. Nor have funding levels been sustained for flood dynamics research and monitoring, following the completion of aid supported projects.



**Table 5: Bangladesh - Disaster Risk Management Framework for Floods and Global Food Price Spike for Rural Livelihood Protection and Food Security**

<b>Shock</b> <b>Appropriate response</b>	<b>Extreme River or Monsoon Floods</b>	<b>Global Food Price Spike (GFPS):</b>
<b>Category A:</b> <b>Facilitating decentralised action to reduce risks</b>	<i>EWS Information: Accurate, Timely, Transparent and Comprehensible Flood Watch</i> <i>Measures to reduce transaction costs of financial flows (remittances)</i>	<i>Information: Accurate, Timely, Transparent and Comprehensible Data on production, prices, PFDS operations, private sector stocks</i> <i>Financial instruments to make the market more liquid.</i>
<b>Category B:</b> <b>Risk Transfer</b>	<i>Insurance Infeasible?</i> <i>Refinancing micro-credit</i>	<i>Insurance Infeasible?</i> <i>Encourage forward contracting, futures, pull and call options.</i>
<b>Category C:</b> <b>Limiting impacts on economic activity</b>	<i>Support for Agricultural Recovery: inputs and credit</i> <i>PFDS operations to limit domestic food price volatility</i> <i>Trade measures e.g. removing tariffs and import restrictions</i> <i>Longer term: infrastructural investments in flood control and drainage; support self-protection</i>	<i>Support for Agricultural Production: inputs and credit</i> <i>PFDS operations to limit domestic food price volatility</i> <i>Trade measures e.g. removing tariffs and import restrictions</i> <i>Longer term: scale up public and private storage capacity</i>
<b>Category D</b> <b>Limiting impacts on poorer and affected households</b>	<i>Social Protection for poor and affected people</i> - <i>food based instruments</i> - <i>cash-based social protection including credit</i>	<i>Social Protection for poor and affected people,</i> <i>With alerts on effects of prices on real value cash-based measures and adequacy of food based measures</i>
<b>Category E:</b> <b>Macro-measures to sustain growth</b>	<i>Expansionary financing to sustain effective demand</i>	<i>Inflation alert</i>

The emergence of relatively stable and functioning financial networks for the flow of funds in post-independence and post-conflict Bangladesh facilitates post-disaster recovery and reconstruction (e.g. housing), and so the maintenance of economic activity despite flood shocks. Migration of household members is self-insurance. The increasing ease of making internal and international remittances is of relatively greater benefit to the less poor.

*Food price risks:* Grain markets are well integrated and, with the removal of some of the restrictions on importation, interlinked with international markets. Interventions should aim at facilitating further integration. Financial instruments for rice similar to warehouse receipts could make the market more liquid. There is also considerable scope for regulation directed to improving the quality of storage.

Government collection and reporting of production, consumption, storage and market prices through the Bureau of Statistics (BBS) could be improved, made more timely and transparent. For example, Ministry of Food and Disaster Management *Fortnightly Foodgrain Outlooks* are frequently subject to delay and require high level MoF approval.

IT networks and public media make this information and that from international sources rapidly and widely available to traders, suppliers and the literate consumer. It is conjectured that this rapid and widespread dissemination of information about both domestic and international markets could lead to micro-scale but widespread, herd behaviour that could accentuate price volatility (e.g. Timmer, 2009). The issues raised by increasingly available but asymmetric and partial access to information should be, and probably are, under investigation.

Category B for decentralised risk transfer:

*Flood risk:* There is a near complete absence of commercial or formal market mediated risk transfer within the rural economy. Similarly, conventional flood insurance is virtually unavailable in Bangladesh. The numbers are simply discouraging: covariant risks, uncertainty about hazard frequency and intensity would inevitably require very high premiums.

Micro-credit is used for consumption, the payment of private debts preventing asset loss, and to replace lost assets, according to post-flood surveys. Beginning with the aftermath of the 1998 floods, the major micro-credit programmes have been refinanced by central bank accommodation and with international support. Because of the relatively high repayment rates and the low transaction costs of extending further credit through existing arrangements to very large numbers of poor people, micro-credit is *de facto* a comparatively successful form of subsidised commercial risk transfer.

*Food price volatility:* there is a paucity of evidence on the commercial sector and its actual risk transfer practices. Delivery times are short and the trade seems to pass on risks by confining itself to spot and early delivery transactions and retaining low levels of stocks. Measures to improve information and to make the market more liquid should be complemented by new instruments for forward sales.

Government and those advising on food security policy had come to anticipate between 1999 and 2006 that Bangladesh could allow commercial trade and public imports from the relatively stable international market to manage sudden onset disaster shocks. That presumption has to be rethought: required is more quite sophisticated intervention to influence prices and protect incomes and consumption.

*Public risk transfer:* the World Bank (IFC) sponsored inconclusive informal consultations in Dhaka in 2001-2 exploring the scope for government to use commercial risk transfer through instruments such as catastrophe bonds. Possibilities for resort to the commercial reinsurance market are limited by the high risk and uncertainty associated with extreme natural hazards, issues of governance and a lack of evident interest in such instruments within the re-insurance market.

Category C includes government measures to limit impacts of extreme flooding on the productive economy and assist recovery; and in the case of prices, to limit price volatility.

Government intervenes to support to post-disaster recovery of agriculture, employing the instruments used in encouraging productivity growth through input subsidy, credit provision, supporting diffusion of improved varieties. There is also public infrastructural investment in flood control, drainage and irrigation. Similar measures were used to encourage increased production to limit the effects of the coincident disasters shocks and global food price spike in 2007/8.

Government intervenes in grain markets only to reduce rather than control price instability and to procure food for distribution programmes. The government sets procurement prices and limited buying targets. The initial target for 2010/11 was 1.6 million tonnes, equivalent to 5% of rice and wheat production in 2009/10. In response to rising wholesale prices, already above the procurement price, government abandoned in November its 200,000 tonnes target for the 2010/11 *Aman* season in favour of higher imports to ameliorate supply pressures. This reaction is indicative of the limited but real scope for government procurement in moderating price volatility.

Government reduced from the mid 1990s the range and scale of its 'normal year' distribution and stock holding mostly sourced with official imports of rice and wheat. Cuts in public distribution included a poorly targeted and leaky ration system. Monetised distribution for special groups (e.g. army and some large employers) continues to be actively used when market prices are high, for example rising in 2008/9. There is a large scale complex of social protection programmes directly distributing food, discussed below under Category D. An open market sales (OMS) window is intended for use, especially at times of high prices, however volumes fell from 408,000 tonnes in 2006/7 to 286,000 tonnes in 2007/8. Government has a fair price card (FPC) which normally includes some 1.1 million poorer urban consumers. Overall food grain operations continue to be substantial, around 15%, in relation to volumes of commercially marketed commodities, some two million tonnes in 2008/9 and 2009/10.<sup>10</sup>

To encourage commercial imports during periods of shock and potentially tight supply, government has used trade measures. Following earlier moves to deregulate and reduce tariff barriers, in March 2007 government eliminated tariffs on rice, wheat and essential foods. Commercial importers were no longer required to renew VAT registration on an annual basis.

The underlying asymmetry within the food trading system is about incapacity to export even when domestic prices fall towards or below export parity prices of exporting countries. Bangladesh has been an efficient producer at import parity prices but it has been uncompetitive at export parity prices (Hossain and Deb, 2009). The transaction costs of being organised to export intermittently also preclude exporting except on an unrecorded basis. The subsidy and storage costs associated with being in structural surplus (cf. India) are prohibitive. The efficient management of substantially higher levels of stocks would be a considerable institutional challenge for the public and private sectors.

*Category D measures* include all forms of social protection. The Public Food Distribution System (PFDS) has been at the centre of government's safety nets strategy to combat chronic poverty and limit the impacts of natural disasters and other shocks on the income of poor and affected groups. The *monetized channels* target 'priority' groups and poorer urban consumers. The *non-monetized channels*, which directly distribute food to beneficiaries, that have had a more rural focus, include Food for Work (FFW), Test Relief (TR), Gratuitous Relief (GR), Vulnerable Group Feeding (VGF), Vulnerable Group Development (VGD) and Food for Education. These are all continuing programmes that target the chronically poor and can be expanded to respond to a systemic disaster, as they were following the 2007 floods and Cyclone Sidr.

<sup>10</sup> In 2008/9 total operations were some 2.13 million tonnes and in 2009/10 1.96 million tonnes, and were projected in June 2010 to rise in 2010/11 to 2.65 million tonnes. Deb and Hossain put the volume of rice marketed as some 12 million tonnes, and over three million tonnes of wheat were imported in 2009/10. The data, especially on production, but also marketed volumes of grains and private stocks, are widely recognised to be poor and subject to administrative influences. Consequently a recurrent recommendation in evaluations and food policy analysis is for improvements in the quality and timeliness of statistical information on the food economy.

The complex array of social safety nets (SSNs) reflects the history of policies on food and social insecurity in Bangladesh. The major direct distribution channels, FFW and VGF/VGD, were introduced in response to the 1974 famine and hyperinflation, and displaced failed monetised channels. Food transfers provide some assurance of physical access to food and against price volatility. Those channels were largely resourced through large scale wheat food aid, varying annually from 1 million up to 2 million tonnes following a crisis. Since 2000 food aid has been progressively cut back, necessitating resourcing with procured rice and imports. In 2009/10 food aid was below 45,000 tonnes.

Since the 1990s there have been pilot safety nets schemes that made *cash-based transfers*. The '100 Days Employment Generation Scheme' launched in 2008-9 specifically targeting the ultra-poor and marginal farmers by group and spatially in areas that are most seasonally food insecure or prone to river erosion. Initial assessments are positive but indicate serious problems of inclusion and exclusion error. Relevant in the context of this paper, the 100EGP was launched during the price spike, but initial operations were in a period of rapidly falling food prices.

Cash based transfers require far simpler chains of administration and are easily expanded. However, administratively determined rates are notoriously price inelastic and sensitive to inflation. If internal markets are functioning then in Bangladesh prices should be contained close to import parity levels. Two conditions of the relative success of India's National Employment Guarantee Scheme (NEGS) are that first price volatility is contained by public operations, and second physical access to food is assured, apart from immediate local disaster-related disruption.

The SSNs have been relatively successful in making a significant contribution to limiting social economic impacts of disaster shocks. The response to the coincident flood, cyclone and price spike of 2007/8, including all these safety net interventions and food operations, helped to contain this shock. However, they were too small and too flawed by weaknesses in targeting to prevent severe impacts on poverty and associated negative impacts on extremely vulnerable groups. Also because of the limited scale of direct transfers and other monetized channels, in aggregate the effect of PFDS operations that had directly on prices was modest.

The SSNs have serious weaknesses in targeting the poorest and most vulnerable groups and areas (World Bank, 2008). The leakages are probably more serious for food transfers because of the many intermediaries. The programmes are organised through multiple parallel institutions. Nevertheless, this complex and cumbersome system along with civil society activities and micro-credit enable Bangladesh to provide an incomplete poverty safety net, containing the effects of shocks.

The re-emergent issue of extreme food price volatility poses special challenges for the complex and cumbersome system of SSNs. A food price shock is systemic, negatively affecting all households excepting surplus producing farmers. It is widely believed that speculators, hoarders and corrupt officials are profiteering, given acknowledged problems of governance. The food transfer system, depending on procurement and officially organised imports, is unable to respond quickly and so is failing to be fully counter-cyclical. The volume of food distributed rose by 67% between 2007/8 and 2008/9 just as prices sharply declined, falling back in 2009/10 as prices began to rise again.

The Category C and D instruments available to government are all relatively small and inflexible, especially in the case of the multiple distribution channels. This multiplicity of instruments reflects a complex of political and social influences and goals. The period 1993-2006 was one of liberalisation, whilst maintaining a considerable capacity to scale up food-based social protection in face of crisis. Since 2007 there are indications of increasing concern about national food security which will possibly lead to a more precautionary approach. This may include measures to promote relatively greater self-sufficiency in food grains: promoting and subsidising production, maintaining higher public stock levels and encouraging higher private stock holding, and scaling up monetised operations including Fair Price Cards and OMS as well as the EGP.

There are also *macro-economic measures* (Category E), which aim to limit the economy-wide impacts of the *disaster shocks*. The Ministry of Finance and the Bangladesh Bank have been expansionary following each major flood disaster since 1998 to minimise the direct economy-wide shock to growth. Part of the public financial response is adjustment: reallocations to relief and reconstruction within the existing budgetary envelope. IFIs such as the Asian Development Bank (ADB) have also provided additional funding, but again part of the external response has been to reallocate from underspends or to bring forward expenditure on existing commitments within the aid pipeline (Benson and Clay, 2001).

An external food price spike, as in 2010, is in contrast inherently both inflationary and extremely regressive in its impacts on poverty. The balance between expansionary measures and adjustment to contain inflationary pressures is more difficult than in the case of a disaster shock.

## 4.4 Conclusions

For Bangladesh the uncertainties about natural hazard risks as well as those concerning external shocks suggest a precautionary approach to managing these risks. A layered approach is helpful in understanding priorities and incorporating price volatility into a wider risk management.

The policy framework suggested by Galtier for limiting price instability is useful as a device for organising the multiplicity of objectives and instruments concerning disaster risk management and food security. Many of the appropriate instruments are similar for supporting agriculture and social protection. There are similarities too in the difficult to organise policy area of facilitating decentralised action. The instruments available to government are many, but cumbersome, especially in the case of the multiple distribution channels. This framework highlights the multiplicity of instruments, which reflects a complex of political and social influences and goals.

The period 1993-2006 was one of liberalisation, whilst maintaining a considerable capacity to scale up food-based social protection in face of crisis. Since 2006 Bangladesh has experienced a food policy cycle which is cobweb-like and is also synchronising closely with international price movements. So domestic volatility is being amplified by the 2010 surge in commodity prices. There are indications of increasing concern about national food security, which will possibly lead to a more precautionary approach.

The emerging consensus amongst domestic food policy analysts is that Bangladesh should target self-sufficiency in rice production (i.e. promoting increased productivity) to meet domestic demand in a normal year, and then use a combination of the international market and stocks to respond to a major shock. The behaviour of exporter countries in a small international rice market means that Bangladesh will have to undertake precautionary measures to ensure food security in disaster years. These include increasing stock levels, expanding social protection and work for cooperation over the rice market, so heavily influenced by the preferences of a few producing and exporting countries.

Hossain and Deb (2010) suggest the role of government involves maintaining a fine balance between protecting the interests of poorer consumers and commercial farmers. This too is part of achieving a wider balance between sustaining growth and poverty reduction in an uncertain context of environmental change.



## 5 Uncertainty, risk frameworks and food insecurity in Malawi

This section presents the contrasting case of Malawi, a land-locked low income country for which global cereal movements are a far less important issue than endogenously driven extreme internal price volatility. We first examine domestic price spikes and sources of vulnerability to food crisis. Next we explore the use of a layered approach to food security and disaster risk management leads to a focus on systemic, complex weather-related disaster risks. Again Galtier's categories provide the analytic structure for the review of interventions addressing chronic food insecurity and price instability. It is concluded that there is considerable scope for improving the use of more traditional instruments for market stabilisation and social protection. The full case study is included as Annex C.

### 5.1 Background

*The 2008/9 food price spike and beyond*<sup>11</sup>: The recent trend in Malawi maize prices has been wholly contrary to those in international prices, thus showing the limited degree to which Malawi is integrated into global maize markets. However, there is extreme internal price volatility. Domestic staple prices in Malawi are strongly seasonal, with a typical peak in January-March prior to the maize harvest. The severity of the price spikes in 2008 and again in 2009 of the order of 150% from immediate post-harvest levels must have put considerable pressure on vulnerable groups. Again in 2010 the seasonal range has been 60% or more. These price fluctuations are very large given high poverty levels, and suggest a need for continuing social protection to minimise the effects of seasonality on both the rural and urban poor.

Malawi previously experienced severe food crises in 2001/2 – 2002/3 and again in 2004/5 – 2005/6, so there have been three periods of crisis and extreme price volatility within a decade. This implies an extraordinary high level of systemic food insecurity risk. Issues raised include the following: why are the problems endogenous and so severe? What has been done to address these problems since 2002? Next, focussing specifically on prices, what is being done to address this extreme seasonal variability, amplified by both weather and apparently regional influences? The primary policy challenge in the context of this study is not therefore coping with international price volatility; rather it is incorporating the management of natural hazard shocks into a framework for reducing chronic poverty and systemic food insecurity, of which price volatility is a primary symptom.

Malawi has been something of a test bed for internationally supported food security initiatives since 2002, reflecting a wider awareness of chronic poverty, food insecurity, and dependence on aid, as it has struggled to restructure the economy.<sup>12</sup> Initiatives include a range of interventions in all the four categories: to strengthen decentralised behaviour, pilot schemes to support risk transfer with crop insurance and by government, intervening in markets and supporting production through the use of subsidised input packages in recovery and as part of broadening the basis of social protection.

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<sup>11</sup> Malawi follows a split year – July-June, with the main maize harvest at the very end of the year in April-May and a typical annual pattern of prices peaking in the hungry season of January to March, when even a majority of self-provisioning farming households have exhausted their retained stocks and are obliged to purchase food staples.

<sup>12</sup> Malawi was forced to restructure its economy to take account of the growing dominance of South Africa in the region, the secular decline in its major export, tobacco, and the slow recovery in its transport links after the end of the conflict in Mozambique. The remittance economy suffered from the loss of South African jobs, and then the desperate state of the Zimbabwe economy has been another factor. Governance, change in domestic political situation is surely also a factor, with a decline in the ability to respond but also much greater openness and information about problems, which might not have been known or recognised under the Banda regime.



## 5.2 Spikes, crises and sources of vulnerability

The extent of extreme vulnerability of the people of Malawi to shocks apparently increased during the period from the mid 1980s until around 2001/2. This increasing vulnerability makes it difficult to attribute food crises to precisely defined natural hazard events. That leads us to categorise the food security crises which have affected a large part of Malawian society as *systemic, complex weather related disasters*. The worst manifestations of this chronic and systemic food insecurity were the crisis of 2001/2, continuing into 2002/3 and the crisis of 2004/5, again continuing into 2005/6. This was also a period of crisis from a health perspective.<sup>13</sup>

Extreme food price volatility is also a clear indication of the severity of these crises, bearing in mind that 60% of maize producing households are at least partially in deficit.<sup>14</sup> The price spikes are seasonal and reflect the increasing reliance prior to harvest on purchased food.

Domestic price movements are more extreme than international price volatility, as reflected in movements in US and South African export prices. Nor are these spikes closely associated with the movements in international (US) and regional (Southern Africa) exporter maize prices, and the correlations between Malawi and external prices are weak. (Figure 3 and see also Annex C Figure 14 and Table 14).

### Comparing 2001/2 and 2008/9

The 2001/2 crisis and 2008/9 spike are especially problematic because it is difficult to precisely relate them to specific natural hazard events. Rather, weather related variability in agriculture appears to intensify chronic and systemic food insecurity, whilst flooding causes more localised covariate losses. The sources of this extreme vulnerability are complex and related to widespread poverty, intensified by contingent factors and extreme events. There are, however, important differences between these food crises, reflecting some successes in addressing vulnerability since 2002.

Analyses of the extreme, systemic food insecurity in Malawi that contributed to the 2001/2 near famine, and a five-year period of chronic food insecurity, typically include the following influences:

- Widespread environmental degradation;
- Limited adoption of yield improving inputs, especially in subsistence maize cultivation;
- Growing reliance of rural households, partially and highly seasonally, on markets for basic foodstuffs;
- Diseases, especially HIV/AIDS, but also increased incidence of malaria, and locally bilharzia, reducing capacity of the workforce and leaving many households without adequate means for a livelihood;
- Slow incomplete rehabilitation of international transport linkages through post-conflict Mozambique contributing to high import parity and low export parity prices, and also extended lead times for organising imported food;
- A reduction in migrant remittances; and
- Weakness of public marketing institutions in the wake of liberalisation and with poor governance (see below and Tschirley and Jayne, 2010).

There were the additional effects of external shocks on the Malawian economy. This accumulation of interacting negative influences made Malawi by 2000 amongst the poorest, food insecure and disaster prone countries.

<sup>13</sup> Since 1987 epidemics are responsible for more deaths than floods and drought combined. Epidemics would therefore rank as a higher priority risk in terms of the current UN/ISDR definition of a disaster than floods or droughts, singly or combined. The most deadly epidemic disasters (other than that recorded for 1989) fall immediately before, during and after the prolonged period of poor weather affected harvests and flood during 2001 – 2005 (Hay and Phiri, 2008).

<sup>14</sup> Some 10% of maize growing holdings are in surplus (SOAS, 2007).

### The 2008/9 food price spike

International price volatility appears not to be an important direct contributor to domestic price volatility in Malawi, or in neighbouring countries (White and Ellis, 2010). The 2008/9 spike, during which maize prices had risen some 180% above early 2007 levels prior to the 2009 harvest, had come after four years of multi-faceted efforts, with considerable international support, to strengthen food security. These efforts included the whole range of interventions to facilitate the internalising of risks and transfer of risks by agriculturists, to provide social protection and to increase small farmer productivity in growing their own food. And yet the spike was far from fully anticipated or subsequently amenable to a convincing explanation. For example Dorward and Chirwa (2010) suggest a somewhat different complex of influences, including higher real incomes and more serious supply side problems, because, as in the seasons prior to 2001/2, reported agricultural development successes were somewhat exaggerated.

The explanations for the 2001/2 crisis and extreme 2008/9 food price spike are then different and complex. There is uncertainty about the precise causal factors and their relative influence. In 2001 there was such extreme vulnerability that there were indications of a potential famine even before the planting of the maize crop had begun. That a higher level of effective demand contributed to the 2008/9 spike is consistent with evidence of much more localised food insecurity than in 2001/2 and 2004/5. In both 2001/2 and 2008/9 specific government interventions also contributed to a tighter market situation. There are doubts about over-estimation of production of maize and other staples prior to 2001/2 and again prior 2008/9. This is an obstacle to effective immediate public action and, as discussed below for providing a basis for risk transfer.

## 5.3 Food Insecurity and disaster risks: a layered approach

The framework of disaster risk reduction for Malawi is even more problematic than that for Bangladesh. This is illustrated in Table 6 in the form of a Stirling matrix of incomplete knowledge for extreme river flooding and what are characterised as complex weather related food crises. In retrospect Malawi can be seen to have slid invidiously during the 1990s into a condition of extreme vulnerability, with chronic and systemic food insecurity, as well as high exposure to communicable diseases closely associated with widespread poverty. Malawi then experienced a sequence of weather-related food crises from 2001 -2006, each associated with extreme price volatility.

These crises are commonly described as '*droughts*', but from a hydro-meteorological perspective they were not 'extreme' events, as had been the droughts of 1948/9 and 1991/2. These episodes are therefore characterised as *complex weather related crises* that would be considered, because of the extreme impacts, to be disasters according to the ISDR definition.<sup>15</sup> This empirically based characterisation of the disasters that have affected Malawi is, however, highly problematic for designing risk transfer instruments that focus only on a rainfall deficit.<sup>16</sup>

Since 2002 there have been substantial efforts by the Malawi government, civil society and international support to reduce food insecurity and limit price volatility, using a range of instruments which is considered in Section 5.4. The spike of 2008/9 is therefore 'puzzling' in the light of reported 'successes' in addressing food insecurity and promoting food production from 2005/6 onwards. The balance of factors is apparently different in 2008/9 from previous spikes, but the risk of another crisis must be considered to be very high, unless it could be demonstrated that people are less vulnerable – better able to cope with environmental variability – and that public actions are more effective in limiting impacts. On the evidence available there is a very high risk of another weather-related crisis but the comparison 2005/6

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<sup>15</sup> "Disasters are extreme impacts associated with a severe disruption of the normal, routine functioning of the affected society, but a disaster may also arise from a concatenation of physical, ecological and social responses to lesser physical events." ( UNISDR, 2009: italics added)

<sup>16</sup> The widespread tendency to treat rainfall variability as a one tailed problem of drought and deficits during the growing season results in excessive rainfall being ignored or misinterpreted as 'drought' or even as 'flood' in the case of the 2001/2 shock (S. Carr in IDC, 2003; Clay *et al.*, 2002)

with 2008/9, the implications are not well defined (Table 6). This potential for a food crisis is the focus of our review of risk frameworks (Section 5.4).

**Table 6: Malawi - Natural Disasters and Food Spike Risks**

Annual probability (layer of risk)	National (Systemic) Shock	Comments
High risk $P \geq 0.1$	a. Complex Weather Related Crisis: 1991/2, 1994/5, 2001/2; 2004-6, 2008/9 a	Implied Annual P (1991-2010) = 0.25
	b. Extreme River Floods: 1991, 1997, 2001, 2003, 2008	Draft NDMS (2010) listing: Implied Annual P (1991-2010) = 0.25  These events are NOT systemic disasters
Medium risk $0.02 < P < 0.1$	c. Extreme Drought: 1948/49, 1991/2	Implied annual P (1941-2010) = 0.03 Draft NDMS (2010) also lists 'meteorological droughts' in 1987, 1992 1994, 2004 and 2005.
	d. Coincident GFPS and Extreme National Disaster:	The implied annual probability is uncertain, but at least equal, assuming independence, to the joint probability of a GFPS (0.1) and the combination of flood or complex weather/drought risks:  $P_d \geq 0.1(P_a + P_b) = 0.05$
Low risk $P \leq 0.02$	e. Catastrophic earthquake:	Risks are low, but possibly non-stationary – increasing with elapsed time since last extreme shock

**Source:** National Disaster Reduction Strategy (Malawi, 2010); Dorward and Chirwa (2011).

**Note:** The complexity is further indicated by the spike relating to a production & rainfall season, and the subsequent marketing year (e.g. 2007/8 and 2008/9).

*Floods* are the most frequent and widely reported natural hazard in Malawi, but these events are at a localised level, high covariate risk (Table 6).<sup>17</sup>

There are weak linkages between domestic and international markets and limited transmission from the latter. This implies that a global food price spike, although potentially globally a high probability event - annualised probability around 0.1 (Table 4) - should not be regarded on the basis of historical experience as a high risk threat to national food security and anti-poverty focussed development in Malawi. Furthermore, it is questionable whether specific measures are required to address the costs imposed by international volatility. The possible exceptional circumstance is when there is already an anticipated highly likely threat of domestic crisis, and

<sup>17</sup> The southern Lower Shire districts are most vulnerable to flooding, displacing people and resulting in damage to fixed assets and crop losses. Flood may also be a contributing factor in a complex shock as in 2001/2. The connections between environmental degradation and flood patterns in the Lower Shire River is well recognised and warrants further investigation in the context of Rift Valley tectonics and also climate change – another area of uncertainty.

so it might be provident to programme or take an option to ensure delivery at a predictable cost (see below). The probability of such a coincident event is assessed as a medium risk on the basis of historical experience (Table 6). However, perceptions that shape policy are sensitive to recent experience and the near coincidence of a global food price spike in 2007/8 and the subsequent domestic maize price spike in 2008/9 has at the least increased awareness of international prices.<sup>18</sup>

*Extreme droughts* are uncommon in Malawi.<sup>19</sup> And again it is unclear what additional measures might be appropriate beyond those required to limit or prevent a weather-related crisis. Perhaps there is scope for research to investigate the benefits and costs, for example, of stock and virtual stock possibilities in addressing the risk posed by such an event, especially in the context of investigating the potential costs of adaptation to climate change.

*Catastrophic earthquake*, a low but uncertain hazard risk which could raise issues of siting and design of infrastructure as well as regulation of buildings, is beyond the scope of this study.

This layered review of hazard risks and food price volatility suggests clear priorities. A national disaster risk reduction strategy should in the first instance be organised to minimise the risk of further complex weather related food crises. As such crises are typically associated with extreme food price volatility, there is presently no easily separable food price stabilisation agenda. To explore this conjecture we examine in Section 5.4 the range of interventions employed in parallel for a food crisis similar to those experienced since 2001 and a food price spike. The disaster risk reduction strategy should also be concerned with health insecurity and minimising the negative impacts on development and poverty reduction. This strategy will also encompass measures to minimise the potential impacts of extreme drought, which historically have been uncommon in Malawi.

Floods, which are locally a disaster almost every year, should be addressed through disaster risk reduction measures, including enabling the vulnerable to reduce their exposure, contingency planning and contingency funds, emergency assistance, recovery and social protection. Floods *per se* are not a source of systemic food security risk in Malawi and are not considered further in this chapter.

## 5.4 Risk frameworks: food crises, disasters and food price spikes

*Category A interventions* aim to facilitate normalisation of outcomes and enable those potentially affected to retain risks (Table 7).

There is an established public agricultural marketing and information system. Efforts are being made to improve the availability of this and other information on commodity prices within Malawi to smaller scale producers and traders. Such initiatives are critical in addressing the problem of asymmetric information in markets that especially disadvantage the poorest producers and those located away from main marketing centres. Agricultural commodity exchanges can also reduce price instability through more rapid spatial and inter temporal adjustment of prices.

The Malawi Agricultural Commodity Exchange (MACE), established in 2004 with government support, seeks to provide information service and a platform for the expansion of futures trading. MACE has launched an SMS and radio-based information and also a telephone-radio platform for bringing together those wanting to engage in small individual trades. The volume of transactions is still small, with total sales of \$254,000 reported in 2008.

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<sup>18</sup> There is also awareness of the risk of very high fertiliser prices as in 2008 which could have very severe impacts on Malawi's capacity to import fertiliser with food security and macro-economic implications.

<sup>19</sup> Malawi lies on the ill-defined shifting boundary between the more variable and so drought prone South East African climatic zone and the more humid, less drought prone East African zone. (Private communication from M. Hulme)

Most recently a private SMS market information system platform was introduced in December 2010. Subscribers paying KW150 per month have access to prices for six commodities. The initiative is implemented by ESOKO, a West African based info tech company under a USAID contract with US based CARANA Corporation.

A warehouse receipt system such as trialled in Zambia, and which could deepen the market, has attracted MACE interest, but so far not been attempted.

Informal cross-border trade with northern Mozambique is significant and *de facto* an accepted market inter-linkage. For example, FEWS and GIEWS reports openly refer to this trade. Mozambican as well as Zambian markets exhibited a similar pattern of volatility to Malawi during 2007-2009 (White and Ellis, 2010). Given the effectively open borders, especially with Mozambique and also with Zambia and Tanzania, further research into markets in neighbouring areas of those countries might clarify whether the spikes were wholly internal (endogenous) or more regional in character.

**Table 7: Malawi - a disaster risk management framework for complex weather related crises and extreme drought**

<b>Shock</b> <b>Appropriate response</b>	<b>Complex weather related crisis</b>	<b>Food price volatility</b>
<b>Category A:</b> <b>Facilitating decentralised action to reduce risks</b>	<i>EWS Information: Accurate, Timely, Transparent and Comprehensible Weather Forecasting</i> <i>Measures to reduce transaction costs of financial flows (remittances)</i>	<i>Information: Accurate, Timely, Transparent and Comprehensible Data on prices, production, public and private stocks and envisaged market operations</i> <i>Financial instruments to make the market more liquid.</i>
<b>Category B:</b> <b>Risk Transfer</b>	<i>Weather Insurance may be infeasible</i> <i>Refinancing micro-credit</i>	<i>Insurance is feasible</i> <i>Encourage forward contracting, futures, pull and call options.</i>
<b>Category C:</b> <b>Limiting impacts on economic activity</b>	<i>Support for Agricultural stability: inputs and credit</i> <i>Food market operations to limit domestic food price volatility</i> <i>Trade measures e.g. removing tariffs and import restrictions</i> <i>Longer term: infrastructural investments in hazard reduction including flood protection, irrigation and support for self-protection</i>	<i>Support for Agricultural Production: inputs and credit</i> <i>Food market operations to limit domestic food price volatility</i> <i>Trade measures e.g. removing tariffs and import restrictions</i> <i>Longer term: scale up public and private storage capacity and improving market management</i>
<b>Category D</b> <b>Limiting impacts on poorer and affected households</b>	<i>Social Protection for poor and affected people</i> <i>- Including input subsidies, food transfers, cash transfers, nutritional interventions and public works</i>	<i>Social Protection for poor and affected people</i> <i>- including input subsidies, food transfers, cash transfers, nutritional interventions and public works</i>
<b>Category E:</b> <b>Macro-measures to sustain growth</b>	<i>Expansionary financing to sustain effective demand</i>	<i>Inflation alert; budgetary crisis alert</i>

The Meteorological Department provides advanced seasonal weather forecasts in collaboration with the Southern Africa Regional Climate Outlook Forum (SARCOF), which are now widely disseminated by radio and other media. Such information also feeds into the Ministry of Agriculture's early warning system operated in cooperation with FEWS and the wider FAO supported regional EWS. The seasonal subsidised input campaign (see below) also now takes seasonal forecasts into account.<sup>20</sup>

Both producers and traders are now potentially better informed about agricultural prospects than a decade ago. The more established information arrangements and recent initiatives are more likely to benefit larger scale commercial farmers, who are able to interpret forecasts for themselves and the relatively better-off poor farmers, especially where there are user fees. The poorest frequently have little flexibility in the timing and scale of their sales. A test of the success of such initiatives is whether there is reduced spatial and temporal variation in market prices over time. Another issue is whether for example agriculture is responsive to information in input use or the take up of insurance. The usefulness of such initiatives should also be qualified in recalling that in 2007 only 10% of maize producers were net sellers and it will be important to determine who is better informed and the distribution of benefits.

*Category B Risk Transfer:* this is attractive both for broadening the options available to the private sector and potentially reducing the need for and costs of public action (Table 6). Malawi is one of the countries benefitting from risk transfer initiatives that are being piloted with World Bank led international support. Historically, there was a near complete absence of commercial market mediated risk transfer for the vast majority of small scale farmers, the 80% operating with between 0.5 and 2.5 ha of land. Therefore effectiveness of such schemes in actually involving small scale producers needs to be fully evaluated.

Promotion of commodity exchanges is a way, already noted, of facilitating futures trading. There are, however, practical obstacles to the development of a formal futures market, especially for staple foods, where there is a substantial level of informal trade and also a well-established history of government intervening unpredictably to ban or restrict trade. Most recently there was a ban on exports of maize in 2008 and then from August 2009 after prices had fallen dramatically restrictions were temporarily ended, again allowing private exports of maize.

The World Bank and partners have supported pilot index-based weather or parametric insurance in Malawi. Crop input cost insurance was made available with credit for small scale groundnut and tobacco in 2005. These pilot schemes were abandoned after the initial trial because there were a variety of implementation problems (Hazell *et al.*, 2010). Are such schemes a leap too far from desk-based theorising to be practically implementable? Therefore the effectiveness of such schemes in actually involving small scale producers of staple crops needs to be carefully evaluated.

### **Country-level risk transfers**

The other approach to risk transfer being piloted is on a collective basis. Commodities price instability and food crises in particular have had unpredictable and severe impacts on the public finances because of interventions to limit price extremes, support agricultural recovery and additional pressures on social protection programmes. The government spent some \$200 million responding to the 2005 crisis (Benson and Mangani, 2008).

The Malawi government with support from DFID, took out a call option for a specified quantity of maize in 2005 on SAFEX and was able to exercise this option successfully in order to offset a rise in spot import prices that had occurred in the intervening period.

Building on that successful experience and the results of earlier weather derivative pilots, the World Bank devised a *weather risk management contract* for the Malawi government to help limit the potential financial risks of drought. DFID paid the initial premium for the contract in 2008/9 intermediated by Swiss RE and renewed for 2009/10 and 2010/11.

<sup>20</sup> FEWS, Malawi Food Security Update September 2009.



This pilot contract displays certain features of critical concern about the market-based approach using a parametric indicator:

- The sustainability of an instrument when based on World Bank (IFI) intermediation and donor funding to subsidise the contract with the commercial market.
- Institutional arrangement - the premium and TC are funded as a component of an Agricultural Development Programme Support Project.
- It does not pay out to the farmers who may have individually incurred substantial losses from drought, but to the 'country' in the form of a financial capability to cover future maize imports.
- Reliance on an apparently consistent past relationship between rainfall data and production statistics that have in the past been modified *ex-post*. The actual relationship may be compromised by recent official estimated maize production levels in Malawi that seem seriously at odds with observable price trends in the domestic maize market.

This contract is an experiment in public financial risk transfer: the practicality and ultimate usefulness of such an instrument for Malawi itself have to be considered in the context of other public actions to limit the interacting impacts of agricultural production variability and price instability. Although there is wider interest within the international development community in this pilot project, its sustainability depends critically on whether there is sufficient interest in the reinsurance market in such a risk transfer instrument.

*Category C interventions* seek to limit impacts on economic and income generating activity. Government has intervened actively with multiple food security objectives to reduce price volatility, assure food availability for all vulnerable consumers, and in promoting agricultural productivity and national self-sufficiency (Table 7). The elements in this food security policy include stocks and sales from public supply, which also resources food-based social protection.

Historically government sought to achieve these objectives through regulation of trade, setting prices for publicly supplied food, backed by grain reserves and publicly managed imports (including food aid) and occasionally exports. Unfortunately, the process of liberalisation since the late 1990s provides an example of "the things that can go wrong with public food stocks when politics and economics combine in unfortunate ways" (Ellis, 2010).

In 1999, a decision was made to separate stock holding for food security purposes from the purchase and sale operations of ADMARC, the parastatal agency responsible for conducting public interventions in food markets. A new organisation, the National Food Reserve Agency (NFRA), was created for this purpose. These roles were poorly managed during the food crisis period from 2001/2 up to 2005/6 and made worse by some external interventions. However, the coordination of public stock operations with underlying changes in maize availability has continued to fail in Malawi with another extreme maize price instability episode since 2007.<sup>21</sup>

Public stockholding capacity, if fully functional, is relatively large in relation to total production, presently around 3.5 million tonnes, and a thin domestic market. Were there to be sustained efforts to improve operational practice, better integrated with early warning on production prospects and the household food security situation, then there is scope for market interventions reducing price volatility.

*Trade policy measures* are employed, often precipitately in a crisis context, as a further instrument to ensure domestic availability and contain extreme price movements. Thus in 2007 exports to Zimbabwe were authorised. Then as prices rose large scale private trade (buying and selling) was banned from August 2008. There is some question as to whether this

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<sup>21</sup> In 2008 ADMARC acquired stocks after an apparently relatively poor harvest. But then failed to release these stocks in a timely way to limit the price spike in early 2009. It has continued to hold some 45,000 tonnes of maize into 2011 after market prices fell sharply with the 2009 harvest. After further price falls in 2010 to below its sale price ADMARC is unable to offload aging stocks.

action was destabilising. In a market now overhanging with public stocks private exports are to be allowed temporarily in 2011 through the NFRA. Meanwhile informal trade appears to be only inconvenienced by such action, with maize flowing into deficit southern districts in early 2011 from Northern Mozambique.

Perhaps intervention is unavoidable, not least to resource food-based social protection programmes (see below), and because government has to act in a crisis situation. In this case more predictable and transparent interventions are needed for these actions to be stabilising. Intervention could be better employed to dampen volatility on both a seasonal and inter-year basis. In view of the cross-border market connections, it is difficult to envisage a market intervention and stock-holding policy that can be successful in isolation from wider regional action.

*Agricultural input subsidies* are a major component of food security policy aimed at both limiting effects of weather variability on productivity and assuring household food security. Input subsidisation is widely regarded as having been successful in reducing household food insecurity and raising shorter term productivity growth. Building on experience from earlier programmes, the implementation of a large scale Agricultural Input Subsidy Programme (AISP) began in 2005/6 in response to another crisis, with the objective of promoting equitable production growth and national self-sufficiency. From 2005/6 to 2008/9 the AISP is estimated to have raised national maize production by 26% to 60%. In so doing, it is found to have contributed to wider economic growth and poverty reduction through increased food availability and higher real wages. The scale of the income transfer has also become an important plank in social protection, representing the equivalent of 10% of annual household income for more than 40% of the population. The programme costs however rose considerably to levels which would difficult to sustain, equivalent to 6.6% of the 2008/9 national budget.<sup>22</sup>

The high levels of subsidisation of targeted inputs also play an important role in income stabilisation by cushioning small farmers against losses from weather and pest-related physical losses and the price collapse in thin markets. The subsidised distribution also allows those more in deficit to plant and apply fertilizer in the following season. But assessments have drawn attention to weaknesses in targeting and inefficiencies and quantification does not yield a high rate of return. As the most recent evaluation concludes: "There is considerable scope for changes in programme implementation to raise effectiveness, efficiency and benefits in delivering growth, poverty reduction and food security, but there are also practical and political difficulties regarding the implementation of some of these changes and questions about their effects" (Dorward, Chirwa and Jayne, 2010).

#### Category D: Social protection

During the period since 2002 there has been a move towards a broader *social protection* perspective. Nevertheless, the primary focus continues to be on social safety nets in the short term, including the following components:

- input subsidies;
- food transfers;
- cash transfers;
- nutritional interventions; and
- public works (Table 7).

This complex of social protection directed programmes, described in more detail in Annex C, provides continuing support, taking into account changing spatial and group incidence of vulnerability, the highly seasonal character of stresses and periodic more extreme crises. The extreme volatility in food prices poses a serious threat to the real value of these social protection transfers, especially those in the form of cash. Varying the form of payments –

<sup>22</sup> The budgetary costs have subsequently fell due to falling prices and cuts in volumes subsidised. In this context the validity of the sustainability argument needs to be demonstrated not just claimed." (Dorward & Chirwa, 2011)

offering a variable combination of cash and kind (food or inputs) transfers is yet to become widely adopted due to the management challenges involved.

The *Early Warning System* of the Ministry of Agriculture, which has received support from FEWS and the MVAC, and information inputs from civil society, in a more open society and with improving information technology, underpins the social protection programmes. There is, however, still considerable uncertainty about crop prospects that are sensitive to short term variability in rainfall through the growing season. The considerable retrospective revisions to estimated maize production underscore the difficulties for fine-tuning interventions to anticipated domestic food availability and food insecurity.

## 5.5 Conclusions: towards a viable and effective combination of interventions

The questions surrounding over-estimation of production during 2006/7 to 2008/9 and the re-estimation of food assistance needs during 2010/11 provide recent examples of the difficulties in ensuring an effective combination of interventions. The scale of social protection interventions that has become normal since 2001 has enabled the provision of minimal levels of food security for most vulnerable people, some agricultural growth and progress on most of the MDG goals. This highly precautionary level of protection raises the issue of welfare dependency at household levels and in most at risk areas, for example in southern flood-prone districts. There is also the issue of financial sustainability encompassing input subsidisation, potentially costly stockholding and food assistance with increasingly constrained food aid availability, except in response to a crisis. The attraction of risk transfer instruments to both government and external funders is understandable. These instruments may become established, but seem unlikely to replace more traditional policy instruments in the foreseeable future because of the complex mixture of vulnerabilities and uncertainty regarding weather related risks.

There is considerable scope for improving the use of more traditional instruments for market stabilisation, social protection supporting production growth. Market information (Category A) is improving and there is apparently progress in early warning and needs assessment. Food market intervention including buffer stock management and the use of trade policy is weak and unpredictable. The better integration of market management with social protection is difficult where the latter relies on the advance assurance of sourcing of total supply from local supply and imports. Heavy input subsidisation is more predictable, but the outcomes much less so especially because of technical innovation to increase productivity.<sup>23</sup>

The use of multiple instruments is a sensible precautionary approach recognising uncertainty and the sensitivity of each instrument to price volatility. Practically there are issues of degree and balance between measures necessary to address a complex crisis and those required to address the extreme price volatility that affects Malawi. The policy challenge is the reverse of that in Bangladesh: how to better incorporate extreme crisis risk into the continuing management of price volatility under conditions of high food insecurity.

As the 2008/9 spike demonstrated, price volatility is a core issue in food insecurity and agricultural risk management. International prices are however less of a threat for Malawi. Nevertheless, for a small economy with open borders, improved ways of addressing domestic insecurity have a regional trade dimension.

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<sup>23</sup> An issue that needs discussion is the impact of greater use of shorter season hybrid varieties and of fertiliser on susceptibility to complex weather related disasters. (Personal communication from Andrew Dorward)

## 6 Uncertainty and Risk Frameworks: Niger and other Sahelian countries

This section considers natural hazard and price risk primarily in relation to Niger, which was demonstrated as highly food insecure in crises in 2005 and 2010, with some parallel evidence from Burkina Faso and Mali. The usefulness of the three-stage approach – identifying uncertainties, a layered approach to risks and a fourfold categorisation of policy instruments is again explored. The strong association between weather variability (drought) and intra-regional price volatility makes it difficult to clearly differentiate price volatility as a focus of policy from the fundamental driver of volatility, the weather.

### 6.1 Focus on the 2010 crisis in Niger

Issues of poverty and related food insecurity are presently considered to be more extreme in Niger than in Burkina Faso and Mali, where there has been more progress towards MDGs. So this case study focuses more on Niger, which has suffered the most recent food security crisis of the three countries. There is strong regional covariance in hazard and in price risks due to interlinkages between markets, which is taken in account through parallel evidence from Burkina Faso and Mali.

The 2010 food crisis in Niger was about large numbers of poor people being unable to meet their food entitlements, and increasing malnutrition amongst the vulnerable already experiencing high chronic levels of malnutrition. Following a year of localised drought, self-provisioning fell and large numbers could not buy. This was not because food had become that much more costly, but more because they lacked income to buy food.

Grain markets both regionally and domestically seem to have operated without serious disruptions in 2009/10, as food was available in most markets at prices that had risen through the hungry season at rates no higher than the three previous 'good' years. In contrast, in 2005 prices doubled from harvest to hungry season. The difference lies in unrestricted flows of imports from northern Nigeria and other neighbouring countries. Fortunately too, the limited integration of millet and sorghum with global markets prevented the crisis from being intensified by transmission of rapidly escalating international cereal prices in 2010. Instead, with a relatively favourable harvest in late 2010, cereal prices followed a 'normal downward seasonal pattern, bringing the food crisis to an end, but leaving problems of chronic malnutrition to be addressed.<sup>24</sup>

The issue here is what is 'normal', and therefore apparently acceptable, and what constitutes an impending crisis that requires an exceptional emergency response. In Niger there is extensive chronic food insecurity. So 2010, which has been much better monitored than 2005, may not have been much worse than previous 'good' years.

The initial response to the 2010 crisis was too modest due to denial on the part of the then government and donor caution. So organising a commensurate collective effort was delayed, but less so than in 2005. The scale of actions seemed reasonably well matched to the problems, although it is not clear that those in need were adequately covered because of targeting weaknesses. Another important difference with 2005 is that there (still) was a reasonably widespread Ministry of Health and international agency nutrition care system in place, which was started in 2005 and since sustained. Post-crisis assessments are awaited.

There is an underlying issue of what combination of public actions can reduce the risk of acute food insecurity in a crisis, whilst contributing to reducing widespread poverty and associated chronic hunger and malnutrition.

<sup>24</sup> Child malnutrition rates (GAM) in the hungry season of 2010 were high: 15% to 20% wasting reported amongst young children in most areas. As GAM rates are often above 10% in years without drought or other shocks, there is clearly chronic malnutrition, a problem which is related to poverty and continuing food insecurity.

## 6.2 Disaster risks: a layered approach

An exploratory review suggests that drought risk, the major natural hazard in Niger and the other West African Sahelian countries especially taking into account a coincident global food price spike, is an area of highly incomplete knowledge. However, after reflection the formal step of constructing a Sterling matrix for a single source of risk was omitted. The suggested layering of risk for Niger is strikingly simpler than that for Bangladesh and Malawi, and approximates more closely to the conventional framing of risks for semi-arid SSA countries, whilst drawing attention to uncertainty (Table 8). Systemic disaster risks are mainly linked to droughts, which often touch large parts of the Sahel region. Single year droughts are a frequent occurrence, equivalent to once every five years. Multi-year regional droughts occurred in 1972-4 and 1982-4. But subsequently rainfall patterns have been relatively more favourable.<sup>25</sup> The frequency of 'drought-related' systemic or national crises in the Sahel suggests an extremely high degree of vulnerability.

Estimates of drought occurrence for the region and at a more localised scale are highly problematic. There have been well-evidenced long-wave quasi cycles of relatively higher and lower annual rainfall, which are not well understood. This uncertainty is also associated with downscaling to regional level from global climatic modelling. Some models indicate that the effect of climate change could go either way in this region –more or less arid and more or less variable (as is likely to be indicated in the next IPCC report).

Although the Sahel is known for drought, extreme rainfall and flooding sometimes affect these countries. These events are seldom nationwide and mostly have been limited to certain areas or localities that are not presently assessed as systemic risks.<sup>26</sup>

A global food price spike is a risk for rice, but apparently less so for coarse grains. In this respect the 2008 price increase seems to be associated with the rise in oil prices and induced increase of transport costs rather than directly linked to the global food price spike.

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<sup>25</sup> Most droughts are region wide, but sometimes smaller scale droughts occur. Cereal production data indicate a drought in 1990/1991 that struck Mali and Burkina Faso but not Niger. Burkina Faso was affected by a drought in 2007 that hit Niger to a lesser extent but did not touch Mali.

<sup>26</sup> The damage, however, can be important for the affected populations and sometimes can have a wider impact. Flooding and excessive rainfall in parts of Mali in 2007/2008 had a negative effect on production.

**Table 8: Niger: Natural Disasters and Food Spike Risks**

Annual probability (layer of risk)	National (Systemic) Shock	Comments
High risk $P \geq 0.1$	a. Drought-related Single Year Crisis: 1997/8, 2000/1, 2004/5, 2009/10  b. Locust infestations: 2004/2005	Implied Annual P (1991-2010) = 0.2  Uncertainty because of climate change and the dynamics of vulnerability  Prevalence of shock related to locust infestations depends on the effectiveness with which the respective national governments cooperate and intervene
Medium risk $0.02 < P < 0.1$	c. Extreme Regional Multi-year Drought: 1972-74, 1982-4	Implied Annual P (1971-2010) = 0.05  Uncertainty because of climate change and unexplained long wave quasi-cyclical annual rainfall
Low risk $P \leq 0.02$	d. Coincident GFPS and Extreme Regional Drought	The implied annual probability $P_d \geq 0.1$ ( $P_b = 0.025$ ) is on the medium - low risk boundary and equal to the joint probability of a GFPS (0.1) and the regional drought risks, but uncertain because of climate change and as independence of events is in doubt

Agriculture in the Sahel also suffers from periodic locust 'plagues' or swarms, which can be a national hazard or wider. Unlike droughts, these swarms can be combated. However issues of management and governance may have increased the risk of a systemic event. A relatively effective system of locust control was put in place by the Sahel countries cooperating in CILSS and the Club du Sahel under the coordination of FAO. Since 2000 ownership has been handed over to the respective countries, which are supposed to coordinate through CILSS, with technical support from FAO. Budgeting and management became subject to national laws and procedures and political interference, and the system appears to have lost some of its effectiveness. There was a major locust plague in 2004 contributing to the 2004/2005 production shortfalls.<sup>27</sup>

## 6.3 Risk frameworks: food crises, disasters and food price spikes

Price volatility in the Sahel is closely associated with climatic variability, with its impacts on crop production and animal husbandry, and so on the annual cycle of production and consumption in what continue to be largely rural economies and societies. There are country and context specific influences: weaknesses in governance have contributed to the severity of crises in Niger. There is some transmission of global commodity price volatility as shown in Section 3 and detailed in Annex D. Nevertheless because of the overwhelmingly close

<sup>27</sup> The outburst and its devastating effects are extensively reported in FAO/WFP (2004) reports, which do not elaborate on the causes of the plague. However, the political dimension of the failure to fight this threat becomes apparent from a World Bank (2009) report on food security and safety nets in Niger that does not mention this locust plague as contributing to the 2004/2005 production crisis.



association between prices and the annual cycle of production and inter-annually the weather, it is difficult to isolate a systemic price *volatility* risk from that related to drought. So it is difficult to distinguish policy instruments and interventions directed to enabling decentralised price risk absorption and risk transfer, or limiting price impacts on agriculture, incomes and food security from measures to address the problem usually characterised as ‘drought’. For that reason the review of policy instruments is organised in terms of weather related risks and complemented by a consideration of price related risks.

A discussion of policy has to begin by acknowledging that agriculture and rural societies in the Sahel are highly adapted to ‘drought’ and other natural hazards. However, extreme events can overwhelm coping strategies and these may impoverish and damage human life prospects. These systems are also coming under pressures from population growth and intensification strategies, as suggested by the recent crises in Niger.

Little can be done as yet to protect agriculture on a real time basis from drought. Weather forecasts do not accurately predict where, when and how intensely it will rain. So farmers, most of whom are self-provisioning peasants (*paysans*) and pastoralists, are engaged in traditional risk management strategies involving production, storage and trade, and are assisted or hampered by public interventions.

Up to the early 1980s governments tried to protect consumers broadly by fixing prices and state trading, but these policies turned out to be ineffective and fiscally unsustainable. All three countries liberalised their cereal markets that had been closely administered by the respective governments in fixed prices and monopolising formal trade. Mali and Burkina Faso gradually liberalised their cereal markets from the early 1980s and Niger in the 1990s. The intention was to foster growth.

The market liberalisation and subsequent agricultural policies aiming at diversification and intensification in order to increase production (see Category C) led to a substantial increase of production. All cereals in Burkina Faso and Mali show increasing yields, whereas yields in Niger for millet and sorghum do not show any significant upward trend, with production increases reflecting area extension. Therefore the cases of Mali and Burkina appear to show that agricultural policy matters. Niger, where there have been several political crises during the last decades, is the only country included in the list of countries requiring external assistance for food. A qualification in attributing too much to policy is that since the 1980s agriculture has also benefited from coincident, relatively favourable weather. In the case of the three Sahelian countries we have not attempted to construct a complete disaster risk management framework as we as analysts felt insufficient familiarity especially with for example the multiplicity of social protection instruments in these countries.

**Category A measures to facilitate normalisation of outcomes and enable those potentially affected to retain risks**

*Market information systems:* Liberalisation potentially exposes the many small peasant producers to the mercy of a small class of traders. In order to improve market functioning and their position as sellers liberalisation has been typically accompanied by establishing and strengthening market information systems with donor community help. Most countries in the Sahel now have well established systems that monitor and publish wholesale prices in the main markets on a regular basis. The more advanced systems using modern communication tools like SMS-messages, making use of the growing expansion of mobile telephone networks.

*Decentralised storage:* traditionally farmers and rural community groups engaged in storage to manage seasonality and natural hazard risk. At these same levels storage of cereals is promoted, with NGOs often active partners to reduce poverty related patterns of post-harvest sales and subsequent higher price purchases, and contribute to improved decentralised management of risks.

One approach is to do so in a collective way through village warehouses. Over time results have been mixed. Some warehouses projects turned out well but others encountered problems of financing and poor management. At present attempts are being made to overcome the



financing problem through a system of warrants. Micro finance institutions provide credit by mortgaging the production and give support in management. This system is promising, but the limiting factor often is lack of sufficient funding from the side of the micro credit institutions to extend the system. Linking commercial banks to the micro credit institutions could be an attractive option. The banks refund these institutions allowing them to expand their activities, while the institutions themselves remain responsible for the loan portfolio. Another constraint is a too limited capacity to effectively provide technical and financial advice to borrowers.

### **Category B: Risk transfer**

*Weather related risks:* Formal private sector agricultural insurance for peasant farmers or even commercial scale producers is practically non-existent as in most low-income countries, and the reasons are well understood.

Conventional loss related insurance protecting an individual producer or group against a specific risk is hardly found. However, established micro-credit could provide an operational structure that organises against idiosyncratic and localised risks.

*Index based insurance* is the subject of pilot experimentation in Mali and Niger for commercially oriented maize and groundnut producers as elsewhere (e.g. Malawi in Section 5.4). Weather station coverage is thin on the ground and rainfall data has serious problems of quality that make for difficulty in use for rainfall related payouts. With great local variability in rainfall and lack of assurance about reliability, the problem of basis risk is formidable. Alternatively remote sensing techniques might provide improved rainfall monitoring. Such a system is presently designed and tested by EARS, a high-tech remote sensing company with Netherlands technical and funding support. A pilot project is being carried out in 2011 in four agricultural areas in the western part of Burkina Faso. A similar index was developed for Mali, but farmers there reported that excessive rainfall and flooding was another major source of crop loss (see Annex D). This is another example of the two tail problem ignored in most index pilot projects.

*Price related risks:* formal insurance against excessive price volatility is not available or being attempted. In general, farmers are encouraged to protect themselves through storage against seasonality in meeting their own consumption needs along with production risk. Price risk exposure can also be limited by storage of output after harvest when prices are lowest until prices rise, as discussed above.

*Forward contracting* is another possibility to reduce risk of price volatility, and is not new. A form of forward contracting has been practiced for a long time in the cotton sector, where farmers get seed and fertiliser against a guaranteed market for their raw cotton.

Forward contracting requires long standing relationships of trust. WFP country offices signed several forward contracts in 2010 with farmers' organisations in Burkina Faso and Mali under the Purchase for Progress (P4P) initiative. However, results seem to be mixed so far (see Box 3).

Traders are mainly general traders. Specialised traders are rare. As a consequence they do not invest in infrastructure needed for long term trading in cereals and are in search of short term profit and subsequently offer low prices. They are often itinerant merchants. Known by the farmers, there is no real relationship based on mutual confidence. Forward contracting might be an attractive option. However, it needs accompanying measures in the form of information and training, scrupulous respect of terms and conditions of the contracts by all parties and the creation of an appropriate institutional context.

### **Category C: Limiting impacts on economic activity**

Fluctuations in agricultural production have a huge impact on livelihoods and poverty, as well as on the wider economy. Annual macro-economic growth rates are heavily influenced by fluctuating agricultural production. Given the scale of the problems, the means for effective, short term interventions remain limited.

Mali and Burkina Faso have pursued an active agricultural policy to enhance production. These are essentially long term measures aiming at intensification and diversification to improve food security. They involve the provision of inputs, credits and effective agricultural services. Maize production in rotation with cotton was promoted, and irrigated areas for the production of rice were expanded. Water harvesting and erosion control were introduced into areas dedicated to traditional crops. The 2006-2015 National Food Security Programme of Mali gives extensive attention to the intensification and diversification of production systems and the marketing and processing of agricultural production.

Possibilities of market interventions to restrict price volatility are limited. The systems of marketing boards that were intended to regulate prices and quantities proved ineffective and were abolished. They were replaced by a liberalised market system with limited government interventions around the creation and maintenance of the national security stocks.

Western African markets are integrated in the Western African Economic and Monetary Union (UEMOA) and follow the community rules. This implies free trade for most of the products between the member countries. Import and export restrictions are therefore only allowed under strict conditions. Besides the official trade there is extensive formal and informal cross-border trade with neighbouring countries, especially Nigeria and Ghana. Through these channels world market price volatility is transmitted to the national economies. In general these fluctuations are tempered by the fact that traditional cereals, still the bulk of the food consumption in the Sahel, consist of locally produced varieties that are little traded globally. The main volatility comes from price spikes of rice and maize, and from the effects of substitution of these with local cereals. Price spikes through international fluctuations remain therefore generally limited, the main reason for spikes being production shortfall within the countries.

#### **Category D: Limiting impacts on poorer and affected households**

All countries in the Sahel have an early warning system. Most of these systems were set up in the 1980s in response to the multi-year drought. There is close cooperation between the country systems with coordination assured by CILSS, FAO and WFP and technical support by the Famine Early Warning Systems Network (FEWS NET) (See Annex E).

The different EWS have defined more or less homogenous zones of livelihood systems in terms of agro-ecology and the socio-economic characteristics of the population. The systems have progressively refined the criteria, allowing potentially better targeting of the really vulnerable. Starting as a tool to detect food shortages in an early stage, they keep track of food prices as well and often monitor a number of health indicators of vulnerable groups.

CILSS, FAO and WFP are closely coordinating the systems with the respective national authorities. Joint monitoring missions are made at regular intervals or at request if special problems emerge. This enables the concerned authorities to react quickly to urgent problems if they are so minded.

The responses of the Niger government to the 2010 food crisis, initially identified by the EWS in late 2009, illustrate current practice (Table 9). There has been a broadening of the range of interventions beyond conventional food assistance in kind to protect lives and health, to give livelihood support and to limit and mitigate the effects of rising food prices.

**Table 9: Responses to the Niger food crisis in 2010**

<b>Emergency humanitarian interventions to protect health &amp; life:</b> infants and young children, pregnant and lactating women (PLW). This is crucial to ensure that young children are not irreversibly damaged by the crisis	<b>Livelihoods support</b> to raise incomes of vulnerable groups and classes. This is crucial to ensure that people do not slide into destitution & economic hardship	<b>Market interventions</b> to bring down down/stabilise/mitigate rises in food prices so that people can access the food in markets with what income they have
Supplementary feeding of infants	Subsidised sales of food	
Therapeutic feeding of infants	Free distributions of food	
Supplementary feeding of PLW	Food for work	Emergency imports
Health interventions to combat malaria, meningitis, cholera, etc.	Cash for work	Controlling markets
	Cash transfer	Proactive to keep borders open and allow trade flows
Water and sanitation measures	Subsidised sales of fodder	
	Fodder transfer	
	Assistance with de-stocking	
	Assistance with next year crop (seeds, fertiliser, credit)	

**Source:** Wiggins, Clay and Keats (2010)

#### **Category E: Macro-economic measures to sustain growth**

The Sahel countries have very limited possibilities for expansionary financing to sustain effective demand in face of the negative impacts of a weather related shock. As members of UEMOA their common currency is pegged to the euro. UEMOA members have to strictly adhere to the directives of the joint central bank. However, inflation is also normally constrained, and in single digits. Price spikes as a result of internal inflationary pressures therefore hardly occur. But there is some price volatility resulting from global commodity prices and exchange rate fluctuations between the euro and the US\$ in which currency most commodities traded by these countries are quoted.

Economic growth in general and agricultural growth in particular is important in helping reduce the causes of food insecurity. The Burkina Faso and Mali market liberalisations and subsequent agricultural policies to promote productivity have been associated with a substantial increase in production and thus lower the need for food aid. Niger liberalised the markets much later.

Another important way to promote growth is the improvement of an enabling business environment. The market information systems have much improved the information and communication of prices and quantities. However, market power still remains biased towards the traders. Commercial laws that enable the parties to enforce agreements are badly developed and often ineffective. Farmers often have to sell their production to itinerant collectors. If they do not come there is no market structure where the farmer can sell his products, even at a low price. This incomplete market structure raises the risks for farmers and hampers their willingness to invest within the sector. Therefore, improving the business climate could help stimulate agricultural production.

### **Some tentative conclusions**

The usefulness of the three-stage approach – identifying uncertainties, a layered approach to risks and a fourfold categorisation of policy instruments - is broadly confirmed. The layering of risks again underscores the difficulties of envisaging that extremely vulnerable people will be able to absorb risks to any great extent, as confirmed by the Niger crisis in 2009/10. Similarly the scope for risk transfer when drought is a high, but uncertain risk would seem to be limited.

Global price volatility is not a critical issue for these countries, unless there were to be a coincident extreme regional drought and a global food price spike.

The strong association between weather variability (drought) and intra-regional price volatility makes it difficult to clearly differentiate price volatility as a focus of policy from the fundamental driver of volatility, the weather.

The comparison of similar measures in comparable economies at different times (especially the grain market liberalisation in the three Western African countries) suggests that agricultural and agro-commercial policies do matter and influence the degree to which shocks are felt and the way the economy can cope with it. Thus, long term policies co-determine the possible answers and outcomes to sudden shocks.

## 7 Role of the international community in supporting the management of food price uncertainty

In this section we consider ways in which the international agencies and donors can and do support the management of food price uncertainty in developing countries. This involves moving up a level to focusing on what governments do, although those at the international level do take into account the implications of their actions for decentralised actors: households and enterprises. As this is a scoping study the approach is to consider a selected example of international involvement in each of the four areas of activity for managing price volatility.

The four cases considered are:

- Facilitating incorporation of risk funding and production of information on price uncertainty as an international public good;
- Risk transfer initiatives being supported by WFP;
- Evolving policy perspectives on conventional interventions to stabilise markets and promote production;
- Assuring internationally resourcing of social protection – renegotiation of the Food Aid Convention.

The intention is to highlight priority issues for further investigation.

### 7.1 Information as an international public good

International agencies necessarily became more alert to global and national level price movements during the food price spike of 2007-8. This greater awareness results in increased attention to reporting and analysis of prices and related marketing issues for use by their own and partner organisations and member countries, as well as contributing to wider policy discussion on the nature of the crisis, its food security and wider implications. Several agencies have strengthened the price and market related aspects of their public information activities.

There appear to be two overlapping intentions. First, there is the view that improving public access to information as a public good will lead to better market functioning – addressing the issue of asymmetric information – and more informed public interventions. For example, the World Bank President gives priority to two information areas in a Financial Times OPED addressed to the G7/G20 presidency:

“Increase public access to information on the quality and quantity of grain stocks. Better information reassures markets and helps calm panic-induced price spikes. Multilateral institutions could help identify ways to improve transparency.” [and]

“Improve long-range weather forecasting and monitoring, especially in Africa.” (Zoellick, 2011).

Second, agencies as interested parties are seeking to inform, that is influence, the continuing debates about international and national level price volatility and policy.

Again Zoellick (2011) proposes policy analysis to “deepen our understanding of the relationship between international prices and local prices in poor countries,” and that work could target first those commodities and countries most at risk from volatility.

In particular, FAO, WFP, the World Bank and the US bilaterally by funding the Famine Early Warning Systems Network (FEWSNET) have all strengthened their information activities, with the last three introducing periodic reports monitoring price movements.

GIEWS provides special alerts and reports on crop prospects and food situations on a regional and a country basis, as well as the major producers/exporters of cereals. It has developed interactive databases with rainfall and climate data, as well as national food prices (800 monthly domestic retail or wholesale price series of major foods in 60 countries), and international cereal export prices. FAO has augmented the available price data and gives more attention to prices in its commodity and early warning publication than previously.

WFP launched in 2008 a three monthly *Marketing Monitor* tracking staple food price movements in “vulnerable” countries. The World Bank also launched a three monthly market report interpreting global staple food prices behaviour. FEWSNET more ambitiously instituted a monthly *Price Watch* covering partner countries of USAID humanitarian aid and food security programmes.

These initiatives are all open web-based platforms with associated free subscription lists. They each seek to complement or make available information that is otherwise only available from more specialised sources, e.g. USDA marketing information, or only fully accessible on a user fee basis, e.g. International Grains Council Monthly Market Reports, or from commodity intelligence aimed at the commercial sector, also on a user fee basis. So all these initiatives meet the conditions for being public goods: non-rival and non-excludability.

After initial consultations, we selected the FEWSNET *Price Watch* initiative for closer review, finding that officials in other agencies pointed to this as a new and useful, if geographically incomplete, regular source of information on staple food markets. This case study considers how the initiative was launched, its purpose and scope, audience, sources of information, and lessons learnt so far. The main findings are summarised below and the fuller reviews is included as Annex E.

#### **FEWSNET’s role in price monitoring**

The existence of FEWSNET as a bilaterally funded programme for more than two decades is a reflection on issues of governance and political sensitivity of information in the area of humanitarian assistance and, historically, food aid in particular.

Markets and price data collection and analysis form part of FEWSNET monitoring activities, which also include hazards, national production and livelihoods. FEWSNET largely engages in regular retrieval and management of secondary data, but is also involved in regular primary data collection in some countries. It conducts studies to build the knowledge base used to interpret monitored data and information.

Prior to the 2007/8 spike the main use of price data was to provide an indicator of household food insecurity. There had, however, been a growing interest in markets and trade as aspects of local, national and regional food security. FEWSNET gets market and price data from its market information systems and also obtains data from WFP (e.g. Afghanistan), FAO (e.g. Sudan) and NGOs (e.g. Haiti). Establishing price monitoring has been a relatively low cost activity for FEWSNET.

FEWSNET price monitoring provides a regular but largely factual briefing, *Price Watch*, that is expanding its coverage.<sup>28</sup> The prices relate to specific commodities and markets. That focus can be especially informative when food insecurity is localized and internal markets are not necessarily fully integrated, but are also sometimes part of regional market networks. The reporting is transparent, and perhaps more useful in a food insecurity context than a more opaque national price such as reported by WFP. Some official sources are unable or unwilling to provide or allow timely and accurate information on sensitive price movements to be placed in the public domain.

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<sup>28</sup> The *Price Watch* report is a brief 2-page synopsis of the most noteworthy price trends. The *Price Watch Annex* provides all available “official monthly prices” in national currency and \$US per kg for the preceding month (e.g. for June 2010 in the 31<sup>st</sup> July edition) and 1, 12 and 24 month changes in national currency terms as in percent and as colour coded indicator arrows (blue - stable or limited movement: -4% - +4%; green fall of 5% or more; and red alert - +5% or more increase).

The underlying concept of *Price Watch* is that “anomalies in price behaviours are the core flag or initial indication of a potentially important feature of a change in food security.” Recently, *Price Watch* has presented a brief region-by-region structured analysis of “Observations, analysis and outlook”, drawing attention to what the FEWS analysts regard as ‘*anomalies*’, and to short term developments or trends.

Informal consultations during this study suggest that FEWSNET’s price monitoring reports and its country assessments are seen as useful briefings for busy professionals within humanitarian and food security agencies, including civil society. It would be instructive to know more about sources and uses of information in developing countries including civil society and the media, as well as official partners. For example, how have these groups tracked prices during the emerging 2010 price spike?

#### **Weaknesses in the network of information providers**

Informal consultations also indicate dissatisfactions with the current information network, which were broadly confirmed by the information providers in a stakeholder consultation (WFP, 2009). GIEWS, FEWSNET and WFP together point to a number of weaknesses in existing monitoring of prices, and identify challenges to be addressed in strengthening the provision of information.

In working with national partners GIEWS is handicapped by a lack of information in some countries and difficulties of ensuring information quality, timeliness and reliability. FEWS is more easily able to bypass this difficulty by its wider sources of information and its ability to present simply what is available on a monthly basis. But it is sometimes being handicapped by the lack of a mandate to disseminate this information.

Presently there is a lack of integration of price change data with other food security analyses. There is limited explicit use of market intelligence such as trader knowledge and expectations, which in best cases informs country level food security assessments.

There is the need for sustainable institutional arrangements and a dynamic reporting mechanism tailored to evolving a wider range of actual and potential user requirements. There are inadequate feedback mechanisms such as systematic surveying of users, and so information providers are at best making informed guesses as to what is useful. They are strongly influenced by the needs of institutional interests – USAID country priorities or WFP’s role as a provider of food assistance. For example FEWSNET has almost no coverage of South and SE Asia. WFP monitoring focuses on national price developments for economies with considerable differences in size and market integration, rather than on actual markets. The World Bank’s price watch reporting is strongly interpretative.

What then are the underlying bases of these interpretations and analyses? FEWSNET explicitly focuses on apparent ‘anomalies’ in prices such as those indicated in Table 10 for two the case study countries, Bangladesh and Malawi. However, in the absence of a set of transparent models, this approach involves a strongly subjective interpretation of trends, based on a context specific understanding of seasonality and other influences.



**Table 10: Staple Cereal Prices in December 2010 and changes in case study countries according to Price Watch model**

	Local price/kg	% Change		
	(US\$ equiv)	1 month	12 months	24 months
Mali, Bamako, Millet	169 CFA Fr (US\$ 0.35)	-1	-13	-1
Niger, Niamey Millet	194 CFA Fr (US\$ 0.40)	+3	-11	-2
Malawi, Lilongwe Maize	32 MWK (US\$ 0.21)	0	-27	-48
Bangladesh* Dhaka Coarse Rice (own calculation)	35 TK (US\$ 0.47)	+4	+31	+20

**Source:** FEWS *Price Watch* Annex January 2011 and Bangladesh Fortnightly *Foodgrain Outlook*

**Note:** \* Bangladesh is not monitored by FEWSNET, and so a similar calculation is made using Bangladeshi data

The need for sustainable institutional arrangements both for data assembly, analysis and interpretation is not being addressed, and so funding could lapse if there were even a relatively short period of international price stability. GIEWS, although long established, is considered by those outside to be seriously constrained by FAO's wider funding and staffing difficulties in relation to a very broad mandate. FEWSNET is a wholly USAID funded TC program and the management of the program is put out to tender on a 5 yearly basis. WFP's price monitoring is funded under a Spanish trust fund arrangement.

In the stakeholder consultation hosted by WFP in 2009 GIEWS saw the way forward as involving international collaboration and coordination of activities, suggesting:

- an inter-agency information-sharing network on food security;
- defining specific roles and *areas of collaboration* based on comparative advantage to avoid duplication;
- common international *standards and definitions* for information gathering and analysis;
- further *networking* with various experts and academic and research institutions to enhance analysis.

In a complementary perspective FEWSNET emphasises the country level dimension:

- working with local systems from the start and build in resources for creating sustainability;
- supporting capacity building for wider utilization of monitoring data, building a knowledge base with easy access for partners; and
- bringing local market specialists into the partnership.

## 7.2 Risk transfer

The World Bank President again provides a clear statement of the current conventional wisdom on facilitating and promoting risk transfer by countries at risk to price volatility, suggesting that the international community give support to “develop a robust menu of other risk management products. In some cases, the most useful tools might be weather insurance or a rainfall index; in others, it could be a hedge on energy prices to keep transport and input costs low.” (Zoellick, 2011)

Such forms of *insurance-based risk transfer* have been the subject of considerable attention, and DFID for example has supported experimental *in-country* initiatives such as those in Malawi undertaken with World Bank TC. Hazell and others (2010) in a review for IFAD and WFP conclude that there are potential benefits for agricultural producers. However, there is a formidable list of conditions for success, which are most likely to be satisfied as part of wider support for producers. In this scoping study we confine ourselves to the issue relating to price volatility and layers of risk. Country level risk transfer instruments have been developed to address a *single dimensional hazard risk* such as storms or seismic events in the Caribbean island region (Box 1).

### Box 1: The Caribbean Catastrophe Risk Insurance Facility

CCRIF is a risk pooling facility, owned, operated and registered in the Caribbean for governments in the region. It is designed to limit the financial impact of catastrophic hurricanes and earthquakes on Caribbean governments by quickly providing short term liquidity when a policy is triggered. It is the world’s first and, to date, only regional fund utilising parametric insurance, giving the governments the unique opportunity to purchase earthquake and hurricane catastrophe coverage with lowest-possible pricing. CCRIF represents a paradigm shift in the way governments treat risk, with Caribbean governments leading the way in pre-disaster planning. CCRIF was developed through funding from the Japanese Government, and was capitalised through contributions to a multi-donor Trust Fund by the Government of Canada, the European Union, the World Bank, the governments of the UK and France, the Caribbean Development Bank and the governments of Ireland and Bermuda, as well as through membership fees paid by participating governments.

Sixteen governments are currently members of CCRIF: Anguilla, Antigua & Barbuda, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Trinidad & Tobago and the Turks & Caicos Islands.

CCRIF proposed to make an early payment of just under US \$ 8 mn, 20 times its premium, to the Government of Haiti following the earthquake in January 2010, which is regarded as a contribution to funding immediate recovery measures.

Source: [www.ccrif.org](http://www.ccrif.org)

For sub-Saharan Africa attention has practically focused on drought hazard or rainfall deficiency risk associated with food insecurity and disruption to poverty focused development. This is exemplified by the pilot initiatives for Ethiopia and Malawi. Presently there is an effort to launch the African Risk Capacity (ARC), Pan-African Disaster Risk Pool for Food Security (African Union, 2010). The discussions for the ARC are continuing. What then are some of the risks and issues of concern that are highlighted by this study so far regarding the ARC?

First, the key assumption behind such a risk pool is that these events are not covariate at a regional level as in the ARC case “that extreme weather events do not happen in the same year all across the continent” (African Union, 2010). The validity of such an assumption depends on country participation in the pool and the risks covered.

Second, the projected ARC pool is focused presently on one tail of the rainfall distribution, and so excludes events that involve abnormally high rainfall and associated cloud cover and flooding.

Thirdly, unless the probability criteria for pay-out are set very high then some countries which experience *chronic sensitivity to rainfall deficit* will be drawing regularly on the pool and would not be conventionally insurable. However, in that circumstance, the pool might not pay out in crises such as the Malawi food crisis of 2001-2 or the Niger crises of 2006 and 2010, which were *not* associated with clearly defined extreme drought events.

Covariate risk could become a more serious problem if there is *de facto* self-selection by those counties most exposed to rainfall deficiency. This possibility needs to be carefully considered in terms of layers of risk. There is also the additional uncertainty associated with climate change.

Fourthly, so far risk transfer schemes such as the CCRIF and ARC do not take into account international price volatility. Consequently the implication of price volatility for the value of fixed payout to contribution ratios needs to be considered carefully. If contributions were to be annually flexible, then given the rapidly improving quality of longer term climatic forecasting (e.g. a potential El Niño event) this information might influence insurance decisions of participants. As the country assessments above have suggested, on the basis of historical data the probabilities of a coincident international food price spike and an extreme domestic disaster are apparently relatively low in Africa. But there is considerable uncertainty regarding both climatic and price shocks.

There are presumably associated risks to the successful implementation of the ARC pool concept.

There might be a lack of interest from donors and some other stakeholders to support the funding of the pool or specific government participation. Is there robust economic evidence on the cost effectiveness of capitalizing the risk pool, as opposed to financing *post-facto*, responsive emergency operations?

Governance is another issue: the proposal for the states that the use of "ARC funds in each country would be flexible and depend on the existing mechanisms and priorities of each participating government, with a view to complementing and enhancing existing risk management investments and policy frameworks within each country" (African Union, 2010). There is the Haiti example in 2010 (Box 1).

Cyclone paths and intensity or seismic events are relatively well-defined hazard events. How robust is the weather modelling that underlies a pool?<sup>29</sup> The Malawi case raises the issues of multiple causation of an extreme event and of the quality of agricultural production data, which can be sensitive to external influences. Vulnerability may also be rapidly changing, as in Malawi and Niger. Technical experts point to the need for strengthening and ensuring the quality of meteorological data systems. Could a lack of congruence between model results and actual natural events early in the scheme jeopardise the pool concept?

Innovation in risk transfer is not to be discouraged, but obvious well understood problems of basis risk, moral hazard and as well as unanticipated outcomes make it unlikely for the foreseeable future that these instruments will play a major role in limiting the impacts of price volatility or natural hazard risks for poor people in low income countries.

*Conventional forward trading using futures contracting and options* by importing agencies has been repeatedly identified as an omission from the risk transfer practices of most low income countries. Parastatals mostly do not do it, and unpredictable interventions of governments into markets and trade inhibit private sector forward operations. International agencies such as WFP have also been unable to develop such procurement operations, given uncertainties of

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<sup>29</sup> "The *Africa Risk View* model performs well against historical *drought-related assistance* in Africa, with loss estimates correlating at nearly 90% to actual WFP responses over the *past decade*." (African Union, 2010) Italics are added: this statement implies excluding from coverage the two most recent extreme regionally covariate events of 1983-4 and 1991-2.

funding, donor directive practices and the constraints of tied aid (Ramachandran *et al.*, 2010). DFID's support for a forward option for maize imports for Malawi in 2005 is illustrative of the potential for countries to use such instruments to assure supply and avoid costly spot transactions. Are there ways in which better practice could be encouraged and supported?

Some policy analysts in reviewing these issues from a southern African perspective are quite cautious about more novel market based initiatives and lay stress on supporting improvements in more traditional public stabilisation instruments such as buffer stock operations, use of imports and exports, and market information services (White and Ellis, 2010). The evident significance of price volatility in the cases considered again underscores the potential value of strengthening conventional trading operations.

## 7.3 Stabilising markets and promoting production

### Markets and trade

Other studies from the ODI programme have reported extensively on the ways in which trade interventions by governments have contributed to international price volatility. The conventional view is that governments should therefore simply desist from amplifying volatility is coming under close scrutiny (e.g. Abbott, 2010; Gerard *et al.*, 2010). Interventions by the governments of larger Asian economies were broadly successful in insulating their markets and their very large numbers of poor consumers from volatility (Timmer, 2009), but had 'beggar my neighbour' implications, for example for Bangladesh.

The conventional view has been that open access to international markets can enable countries to limit the effects of internal disaster shocks. There have been successful examples of this in periods of relative price stability, as in Bangladesh in 1998, 2000 and 2004 or Southern Africa during the 1990s. International markets, when stable, can limit the impacts on consumers and the direct costs of a domestic shock. But after the extended period of international price volatility since 2005, and with uncertainty surrounding the prospects for markets, this market-bound strategy appears to be less assured.

*Context is all!* Presently large scale unplanned imports by Bangladesh are cited as one of the upward influences in early 2011 on the relatively small global rice market. In Malawi's case and if there were to be a poor harvest, unless imports can be organised regionally, a perilous time lag can occur unless there is early identification well before harvest and prompt action.

Both of these countries illustrate the special difficulties of countries that face an asymmetric trading situation for their staple foods. As potentially intermittent surplus produces this complex of obstacles to large private or publicly encouraged exports that can be bundled together as high transaction costs plus transport costs for Malawi. In consequence, there is a substantial risk of a short-term cobweb type food policy cycle following an internal production shock (Malawi in 2008/9?) or over-response to a sharp increase in import prices (Bangladesh in 2009).

The situation of Sahelian economies is different. There are active regional markets so that intra-regional trade can play a major role in limiting damaging extremes of price instability. Much of the current conventional wisdom may well fit this case. A possibly important qualification is that the sheer scale of effective demand in oil-revenue rich Nigeria could draw food out of neighbouring states in a tight market situation amplifying price volatility.

Current ideas largely address the upper side risk problems of price volatility. Again, Zoellick (2011) made the following proposal:

- Establish small regional humanitarian reserves in disaster-prone, infrastructure-poor areas;
- Agree on a code of conduct to exempt humanitarian food aid from export bans; and
- Give countries access to fast-disbursing support as an alternative to export bans or price fixing.

The IFI had conspicuously failed to make existing facilities practically and quickly accessible to address food price volatility in the 35 years since the previous 1972-4 spike. Perhaps spikes were regarded as likely to be very infrequent, or only country or regional and so better addressed by ad hoc measures (Benson and Clay, 1998). However, the cost and macroeconomic burden of some of the measures taken by countries in 2008 was reviewed again by the IMF. Both the IMF and the World Bank took measures to support country budgets and extend low-cost loans were already in place. However it was also found that some existing financing instruments such as the IMF's Exogenous Shocks Facility were inadequate, and new instruments were developed in 2008/9 including the World Bank's Global Food Crisis Response Fund and the IMF's Standby Credit Facility. It would be useful to review the experience with these, including the effects of any policy conditionality. (Wiggins *et al.* 2010a)

The conventional wisdom stresses avoidance of trade interventions, or is cautious about large scale grain market operations involving stocks. It does not address this asymmetry issue, where production is sensitive to natural hazard shocks (Tschirley and Jayne, 2010).

Assisting agricultural recovery after a shock is commonly practised through market interventions setting prices and purchasing targets, with a modest— even poor— record of effective and efficient operations, as illustrated in the case study countries. In this context international agencies are being encouraged to become involved too.

"One concrete step would be for the G20 to help farmers benefit from tenders from humanitarian purchasers such as the WFP. This may require flexibility to allow development benefits such as building local markets to be taken into account in sourcing decisions. (Zoellick, *op cit*)

Experience so far is that it is not necessarily easier for external actors to be immediately more effective than are governments. This is especially so in taking on multiple objectives of appropriate, timely and cost-effective procurement and also supporting small farmer development.<sup>30</sup> There is much learning to be done, as illustrated by the experience of WFP's Purchase for Progress initiative in Mali and Burkina Faso (Box 2).

## **Box 2: Learning from forwarding contracting in Mali and Burkina Faso**

Under the Purchase for Progress (P4P) pilot initiative, WFP country offices in Burkina Faso and Mali signed several *forward contracts* with farmers' organisations during the planting season between May and July 2010 totalling over 3,700 metric tons of commodities, to be delivered after harvest at the end of 2010. The aim of the forward contracts was to give smallholder organizations assurance at planting time of a guaranteed market, therefore encouraging increased production and facilitating their access to credit.

The results of these forward contracts have been mixed so far. Only 1,200 metric tons have actually been delivered to WFP by 1<sup>st</sup> February 2011. In Mali, despite the long contractual period, farmers' organisations were unable to prepare the commodities on time and have requested extensions on the delivery of their crops. In Burkina Faso, unfavourable weather conditions affected the drying of the commodities in certain areas, so that some farmers' organisations were not able to meet WFP's quality specifications. Farmers in both countries face problems in understanding and reaching the quality standards required by WFP, either due to a lack of communication between the farmers and their organisations or because of inadequate cleaning, grading and storage facilities.

In some areas in Burkina Faso, not all farmers were aware of the terms and conditions of the contract due to weak management structures and lack of communication between the management of the farmers' organisation and their members. Delays in

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<sup>30</sup> Using of in-country or regional purchases through established marketing channels with the single objective of efficient procurement has a relatively good record (Clay, Riley and Urey 2005; NRI, 2006)

granting credit by the involved financial institution to the farmers' organisations hindered them also in the aggregation of commodities from their members.

WFP and partners, is looking at ways in which to better sensitise farmer's organisation about market information and pricing issues as well as improving the targeting of training that aims at enhancing the knowledge of farmers' organisation in commodity management and quality issues. Key will be how this knowledge is passed down to members.

Source: <http://www.wfp.org/purchase-progress/blog/>

*Agricultural input subsidies* are a common component of food security policy aimed at both limiting effects of weather variability on productivity and assuring household food security. The major reservation of IFIs and some agencies concern the budgetary implications and sustainability. There are also arguments about the distorting effects on efficiency and political misuse. All the case study countries practise forms of subsidisation in various forms especially as a response to food crisis. Malawi's recent experience is being widely examined as a successful combination of promoting small farmer agricultural production and extending social protection. The implementation of a large scale agricultural input subsidy programme in 2005/6 and subsequent years led to significant increases in national maize production and productivity, and this has contributed to increased food availability, higher real wages and wider economic growth and poverty reduction. The policy has however created severe problems of budgetary sustainability as total programme costs rose fivefold between 2005/6 and 2008/9.

Assessments conclude that there is considerable scope for building on achievements to substantially raise programme effectiveness, efficiency and benefits. However, there is again the issue of context "Any application of Malawi's subsidy experience to other countries needs to take account of special characteristics of the Malawian maize economy and of measures needed to raise such programmes' effectiveness and efficiency and ensure their best fit with and contribution to sustainable development policies." (Dorward and Chirwa, 2011)

## 7.4 Social protection

Food price volatility raises questions about the forms in which social protection should be provided, and the ways in which the international community should assure the resources to support such interventions. There is a near consensus on the appropriateness of supporting such measures.

An increasingly broad range of interventions are being recognised as social protection. For example the programmes in Malawi include including the following components:

- Input subsidies (as already noted);
- Food transfers;
- Cash transfers;
- Nutritional interventions; and
- Public works (Table 6).

*Food assistance:* A high proportion of the consumption of the poorest is accounted for by food, and so there is a widespread tendency in practice to equate food assistance with social protection. The attempts to classify forms of food assistance as social protection suggest that these concepts are again in practice difficult to distinguish (Harvey et al., 2010) In particular, the provision or subsidisation of agricultural inputs to self-provisioning households, or livestock support schemes during a drought are also ways of supporting agriculture.

Here we would draw attention to a long-standing issue posed by extreme food price volatility. Transfers in cash or cash-equivalents have become popular through an era of relative global



price stability. These are however highly sensitive to prices unless explicitly inflation proofed, which in turn can become a macro level issue of inflationary expectations and budgetary pressures. Careful consideration is required to achieve a viable balance of transfer efficiency and assuring real value of transfers. Perhaps in some contexts a combination of cash and in-kind transfers may be appropriate.

There is a parallel and linked issue of assuring international levels of support for social protection and humanitarian actions in the face of global food price volatility. There are some wider consequences of price volatility. Historically a large proportion of support for humanitarian and social protection has been in the form of *food aid*. The provision of assistance *in kind* is less sensitive to price fluctuations or general inflation than cash-based transfers.

In practice there are two major difficulties. First, the provision of food aid has been procyclical: as the 2007/8 spike again demonstrated, with global food aid levels falling to a new low level. At least prior to this spike food aid levels have recovered with falling prices because the US in particular, which accounts for about half of food aid, programmes the volumes of commodities on the basis of financial appropriations. It is unclear whether that relationship continues to hold.

The second difficulty is that when there is a favourable production response to crisis and associated high prices, the demand for food assistance falls away at household, sectoral and national levels. Frequently, already programmed assistance then becomes part of the market management policy problem. Where there is food assistance in kind then switching to domestic or regional sourcing may be appropriate for managing a localised crisis or in emerging from a wider, systemic or regional crisis. However as noted above (Box 2) taking on multiple objects could be problematic.

There is here a challenge for the international community in the current attempts to reconstruct the international architecture for food security. There is an urgent need to think in terms of a probably more volatile and uncertain global food economy in for example the negotiation of a new Food Assistance Convention or Food Aid Convention (Box 3).

### Box 3: A future food assistance convention<sup>31</sup>

The current 1999 Food Aid Convention declares its objectives as follows: contributing to world food security and improving the ability of the international community to respond to emergency food situations and other food needs of developing countries through making appropriate level of food aid available, in a poverty focused way consistent with agricultural development in recipient countries, and acting as a framework for cooperation, coordination and information sharing amongst members.

To this end, both commodity-based commitments and value or cash commitments were allowed, including transport and other operational costs for the first time. The eligible product list was also extended to cover virtually the entire range of commodities and processed foods likely to be provided as humanitarian relief or in nutritional programmes. Seeds of eligible products, an agricultural input, were allowed. With hindsight, allowing commodity and also cash commitments by the EU, and extending the range of eligible foodstuffs marked a significant change in the Convention: this allows parallel but different commitments and weakens the links to cereals aid and grain markets. The 1999 agreement also recognised, but failed to reaffirm, the minimum contributions as part of a wider commitment to a minimum of 10 million tonnes of cereals aid first made in 1980.

Some of the issues to be resolved include:

First, should future commitments be in physical or financial terms?

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<sup>31</sup> This discussion of the future of the FAC is abstracted from Clay (2010) 'A Future Food Aid or Food Assistance Convention?' ODI Background Paper on Food Aid No. 6, June 2010  
<http://www.odi.org.uk/resources/details.asp?id=4941&title=food-food-aid>



Second, how can commitments be measured in a way that is understandable and transparent?

Third, how can the negative, procyclical effects of fluctuating commodity price and transport cost volatility be minimised?

Fourth, what should be included in the list of eligible forms of food assistance?

Regarding the body supervising the agreement, presently a committee of signatories, its membership and actual functions, there is presently a near consensus that objectives are not realised, and it is not fit for purpose. Some see a continuing useful role for a committee of donors or funders suggesting that the Convention could simply expand. Others wishing to become signatories, for example G20 countries, could also provide funding in support of food assistance. The alternative position, as argued for example by some NGOs, is that representation should be expanded to include aid recipient countries, international agencies and civil society organisations. The legitimacy and also the usefulness of a purely donor grouping are called in question.

## 7.5 Conclusions

Perhaps we should end this review with a personal view: the credibility of international institutional arrangements for food security is in question. The weaknesses of these arrangements were exposed by the 2007-8 spike and are being highlighted again by the latest commodity price episode and its social consequences. As this review has suggested, only limited progress has been made towards incorporating the real possibility of continuing price volatility into disaster risk management. Such is current uncertainty about the drivers of volatility and how markets will behave in coming months, that something has to be done to address the many facets of this global problem. Take the example of the Food Aid Convention, if this Convention is to continue then the commitments that are made have to be seen to be something tangible that can be understood in funder constituencies. For example, signatories could *collectively* commit funding every year to provide sufficient cash and food to allow so many million disaster-affected and displaced people to meet their food needs. *These commitments should then be in a form that is minimally affected by food or energy price or currency volatility.* The group of funders should be broadened too to take account of a rapidly evolving world order. To do these things is a real challenge and will require imagination and lateral thinking as well as a genuine commitment to succeed.

## 8 Conclusions and Recommendations

What do we learn, or more precisely find to be useful for policy analysis from examining extreme global food price spikes within a framework for management of systemic risks? First, this exploratory investigation draws attention to the uncomfortably high level of uncertainty both regarding the likelihood of further such global market extremes and on whether these might coincide with natural hazard driven national or wider regional episodes of acute food insecurity. Simple “back of the envelope” calculations based on a count of extreme events since, say, 1970, suggest that either further spikes or coincident spikes and disasters are likely to be infrequent. This would be the most convenient assumption for food policy, least challenging to the economic conventional wisdom of the past two decades (Abbott, 2010; Tangerman, 2011). This is misleading because of the uncertainty attached to climatic hazards due to environmental change and the rapidity of socio-economic change. The lack of data, problems of interpreting and inferring probabilities from historical data imply that we are confronted with *non-systemic risks* in terms of the Newberry and Stiglitz (1981) classification of commodity market volatility risks.

This study has been undertaken during another emerging global food price spike. There is, however, no agreement on the balance of influences that drove the 2007/8 spike, and apparent considerable difficulty in determining the likely severity of or predicting the course of the current episode that began in mid 2010 (Annex A).

As this is an exploratory investigation, we adopted a case study approach for purposively selected countries. These cases exemplify two contrasting situations. Bangladesh is a low income open economy exposed to global volatility because of relatively large scale but fluctuating import needs. Then three landlocked African countries were selected, Malawi, Mali and Niger along with Burkina Faso and Mali, where there is a wide price band between importing from the international market and export parities, and so with partial linkages between domestic food staple and global cereal prices.

The investigation begins with country level analyses of basic or staple cereal prices, focussing on the period since 2005/6. The findings underscore the importance of recognising the food policy problem as one of extreme price volatility or instability, and not just about an unforeseen global spike that is unlikely to reoccur soon. For example, Bangladesh is currently in its fifth year of continuing extreme cereal market fluctuations. Import prices are closely associated with global rice and wheat market volatility. Prices also collapse as in 2009 because export of a transient rice surplus is impractical in the short term.

The analysis follows a three-stage approach to incorporate price spikes into a wider framework for disaster risk management. Stage one, a review of aggregate, systemic risks, highlights the uncertainty that surrounds domestic price volatility as a source of food insecurity. Further investigation also suggests that recent extreme domestic food price spikes and associated episodes of acute food insecurity are complex and multi-causal: in Malawi between 2001 -2005 and again in 2008/9, as well as in Bangladesh since 2007. Neither the transmission of rapid upward movement in global prices *or* some clearly isolatable natural disaster shock - a drought or a flood - provides a sufficient explanation. These extreme events each reflect complex multiple causation. Prior to the Malawi (2001) and Niger (2005) food crises there have been rapid increases in vulnerability to climatic variability. The doubtful quality of domestic production statistics is also a common issue in all four countries because of organisational weaknesses in data collection, lack of independence from performance pressures and aggregate figures being negotiated. Evidence for the past decade indicates a high risk of recurrence of such a systemic price shock in any of these countries.

Second, the layering of risks and acknowledging associated uncertainty has critical implications for public policy, the appropriate combination of government interventions and international support. The layering of aggregated, systemic risk highlights also the need for a highly context specific approach to management of price instability. In the four African countries with

low transmission of global food price volatility there is a challenging issue of largely endogenous (but possibly regionally influenced) price volatility. In contrast, open and exposed Bangladesh, with fluctuating import levels faces the challenge of an apparent synchronisation between its domestic food policy cycle and global market movements since 2006/7. Focussing on *high risks* in the African economies, recent crises since 2000 have been associated with unfavourable weather but not very extreme drought such as experienced in 1982-4 in the Sahel or Malawi in 1991/2. Bangladesh is exposed to multiple high risk hazards, as well as other lower risk but potentially catastrophic events. In both the Sahel and Southern Africa there is an apparently low but uncertain risk of a regionally covariate drought.

The third stage is a review of policies to address price volatility and other interacting hazard risks. This review finds policies have evolved especially under external influences on the presumption that international markets and liberalisation and opening of domestic markets will be a source of stability. In none of these countries has policy for risk management taken into account the possibility of significant external volatility. Furthermore, these low-income countries are confronted with unsystemic risks in conditions of uncertainty.

Galtier (2009) proposes a context specific assessment of the role of the four categories for grouping public interventions to *moderate price instability* or *reduce the effects of volatility* on producer and consumer incomes and food expenditure. Category A measures to improve market integration and functioning and Category B promoting risk transfer are fairly clearly defined. However, Category C interventions directly to reduce instability, including to promotion of post-disaster recovery and reducing impacts on livelihoods and social protection (Category D) are less clearly distinguishable. We also suggest explicitly considering, again in a country specific context, macro-economic measures to sustain growth and development and their financial implications.

The provisional layers of risks in step two raise doubts regarding the appropriateness of conventional approaches to supporting food production and reducing price instability and the effects on poorer people's incomes and food expenditure by promoting instruments for private absorption of risk or the transfer of economy-wide or private risks to the international financial markets. Similarly the promotion of cash-based safety nets has not addressed the problem of price volatility. Monetised safety nets have yet to be fully institutionalised in the case study countries. Pilot programmes for private risk transfer through agricultural insurance have been successful only in India, where public interventions have moderated domestic price instability and sensitivity to external market volatility, as well as assuring access to food.

In the African countries a majority of rural households are engaged in self-provisioning: small farmers, as well as agro-pastoralists and nomadic pastoralists (Mali and Niger). In these cases a *livelihood* security and protection programme typically includes measures that impact on production, such as subsidised sales of fodder, assistance with de-stocking, and input support for next year crop (seeds, fertiliser, credit).

A close examination of the continued volatility in food prices since 2007/8 is informative. In two case study countries, Bangladesh and Malawi, there are suggestions of domestic food policy amplifying a cobweb-like cycle. There is following liberalisation a fundamental asymmetry in markets: this arises from a lack of public capacity to moderate a collapse in prices and loss of producer incentives as farmers respond to the price hike with a surge in cereals production.

These perspectives suggest a need for caution against focusing on a single tail of market behaviour – price spikes – the issue is volatility and is highly context specific. For example, in 2010 the Niger crisis was, with hindsight, partially contained, because the 'drought' or unfavourable weather patterns, had not significantly affected neighbouring countries, thus intra-regional trade dampened price movements. Neighbouring states did not impede trade. However, this favourable effect depends on lack of integration between the Sahelian coarse grain economy and international cereal markets preventing the transmission of rising global prices to Niger, as the government, with international support, contained the food crisis until it ended with the favourable harvest in late 2010. In contrast, since 2006, domestic production

and price volatility in Bangladesh appear to have become synchronised with, and so amplified by, international volatility.

The price policy issue is one of domestic volatility or instability rather than managing the effects of exogenous price spikes. After drafting the statistical section of this report we found that others have reached similar conclusions after more in depth investigations into the causes and consequences of the 2007/08 food price spike (Abbott, 2010; Grenier *et al.*, 2010).

The investigation suggests other specific conclusions. Organisations within the international community such as FAO, WFP and the World Bank have begun to provide more widely available information on and regular analysis of market behaviour. For example FEWSNET highlights the need for better ways of identifying and investigating apparent “price anomalies”, which are indicators of emerging food security problems regionally, at a country level and below. The tracking of the relationships between actual domestic prices and the markets which source food and influence import parities, is an example of simple but potentially useful analyses that are possible. Two implicit difficulties in improving food price monitoring are the potential sensitivity of markets to such analyses and the willingness of governments to allow external attention on their domestic markets.

Strengthening agricultural production data systems and making them more transparent should be a genuine high priority. Saying this has become almost a mantra. Nevertheless in Bangladesh in 2010/11, Malawi in 2008/9 and Niger in 2009/10 the weaknesses in the production data systems were a serious obstacle to interpreting these most recent spikes and formulation of appropriate responses.

After an era of near international cereal price stability, apart from the 1995-6 spike, the uncertainty that is now surrounding the short to medium term behaviour of global markets implies a widespread need to re-assess the balance of interventions directed to providing food security, but in a highly country context specific way.

There is controversy or strongly contended views on how best to address current food price volatility in 2010/11 and its consequences. For example in what is a fifth year of extreme price volatility the Prime Minister of Bangladesh responds to prices for basic foods at least 30-40 percent higher than a year ago by proposing a massive extension of food subsidies through open market operations and extension of ration and fair price to around a quarter of the population.<sup>32</sup> In contrast the World Bank President in an open letter to the French G8/G20 Presidency identifies a range of ways of doing better to enable poor people to cope with price volatility whilst conspicuously de-emphasising international or national level market interventions: ‘the answer to food price volatility is not to prosecute or block markets, but to use them better’ (Zoellick, 2011).

The most controversial area of public action is direct intervention into markets through trade measures, open market operations and stock-holding, as well as directly supporting agricultural resilience such as through subsidisation of inputs. These issues are extensively discussed in other studies as part of this programme and elsewhere (Wiggins *et al.*, 2010a). For example, these issues are being debated in a thoughtful way in relation to Malawi and Southern Africa more widely.

Poulton and others (2006) conclude “that a credible state strategy for price stabilisation is desirable firstly because private trade and storage has only limited ability to handle the challenges of exceptional drought or glut years and secondly because a well conceived and transparently managed state intervention, that defines clear “rules of the game” for private traders to operate within, may encourage more private storage activity than a non-credible policy of non-intervention.” There is a growing weight of evidence in favour of increasing stock to usage in food insecure countries such as those in this study.

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<sup>32</sup> “The (Bangladesh) government is going to launch a programme to supply rice and wheat at low price to about one crore (ten million) poor families in next four months in the face of prevailing high food price. The support to the poor will be provided through the extended Open Market Sale (OMS), Fair Price Cards, rationing for fourth class employees and village police members, test relief and Food for Work programmes.” (*Daily Star*, Dhaka, Sunday, January 9, 2011)

Ellis (2010) suggests “private risk management, public risk management and social transfers represent a variety of overlapping methods for achieving a reduction in the frequency and severity of food insecurity crises confronting vulnerable people; and the future task is to get a substantially more accurate understanding of their appropriate coverage and the trade-offs between them.”

In addition to the four areas of intervention considered by Galtier, macro-economic measures to sustain growth and development and their financial implications ought to be explicitly considered. These measures may well be quite different in responding to a distinct natural disaster shock, extreme price volatility or a coincident disaster and price spike.

The purpose of this paper has been to encourage just such thorough and context specific explorations of market volatility in the context of other systemic risks.

Intra-regional food market linkages are clearly enormously important, but relatively under-researched and under-reported, especially because of the sensitivities regarding unrecorded trade.

In reviewing country national disaster risk reduction strategies and plans, we found little attempt to assess hazard risks in a comprehensive way. Rather each systemic risk is considered separately. So it was necessary to provisionally construct a layered framework of major sources of risks from the available data for different hazards. These investigations encourage us to recommend the incorporation of extreme price volatility as a specific threat into an aggregated risk multi-hazard framework, and, on the basis of available evidence, explore the implied layers of risk. Such an analysis could be a useful component of a considered wider review of food security or natural disaster risk management.

What do we suggest at an international level? The ODI programme in another paper in late 2010 identified a sub-set of countries potentially most vulnerable to a global food price spike in 2011 (Wiggins, Keats and Clay, 2010b). These countries included mostly fragile states and those recovering from or involved in conflict, including Somali. We suggest that it would be worthwhile for an analyst acquainted with each of these countries to undertake an aggregated disaster risk assessment, including an analysis of recent market behaviour. Furthermore, as the focus on the Sahel suggests, there is a risk of a regional crisis and a conjoint global food price spike greater than implied by just examining the historical record. There is scope therefore for anticipatory planning for such a wider crisis in any of the regions of Sub-Saharan Africa that include several high food crisis risk low income countries.

## Annex A: Drivers of food price volatility

The debate on the causes of price increases in 2007-08 remains controversial, with some areas of agreement. What is presently happening in 2010-11 to food prices is even more in dispute.

Abbott, Hurt and Tyner (2008, 2009) argued that three sets of factors lay behind the food spike. Supply and utilization trends resulting in low stocks gave rise to conditions where supply shocks (e.g. droughts) mattered more than in earlier years. Exchange rate depreciation and possibly speculation led to financial pressures raising prices, especially in dollar terms. Emergence of the biofuels industry and U.S. biofuels mandates linked oil prices and agricultural prices more tightly than before, so oil price increases were passed to grain and oilseed prices – at least for a time.

Gilbert (2009) has argued that common factors such as exchange rates, financial speculation and monetary policy must be more important than supply shocks given the coincidence of price increases across commodities. Debate on the role of speculation remains more controversial. Von Braun and Torero (2009) as well as Gilbert (2009) argue for its importance, while Irwin et al (2009) and Wright (2009a&b) believe this factor played a minor role. Most analysts agree, however, that isolationist policies pursued by many countries made world price peaks and market instability greater than they would otherwise have been.”

Wiggins (2010) is sceptical of the role of financial speculation during the 2007/8 spike, drawing on the arguments of Irwin & Sanders 2010 that

- On a futures market it is wrong to see funds taking long positions as additional demand. Each futures contract is met by a contrary short position: is this then new supply? Of course it isn't.
- Prices on futures markets do not determine spot prices. Unless the index funds actually take delivery and store commodity, which they don't, they cannot influence the spot market. If there's a bubble driving prices above what they would be in the spot market, then stocks should arise to earn the bubble price. They didn't: stocks were in decline.
- Did the investment funds push experienced traders on futures to positions they would not have taken otherwise? This assumes that traders thought the index funds knew more than they did:

Of course, this would have required a large number of sophisticated and experienced traders in commodity futures markets to reach a conclusion that index fund investors possessed valuable information that they themselves did not possess [Irwin & Sanders 2010].

- Index fund behaviour was predictable: thus if informed traders thought they had misjudged the market, they could always take a counter position.
- Prices rises were seen in futures markets where the index funds did not enter, and for commodities where there are no futures.
- Empirically, the evidence of links from index fund investment to futures prices is weak. What's more, it even seems that the index funds may have actually calmed volatility in the futures markets — which isn't so counter to intuition, when one recalls that the funds operate to predictable rules, unlike the traditional commercial hedgers and speculators in the market that take spot decisions whenever needed.

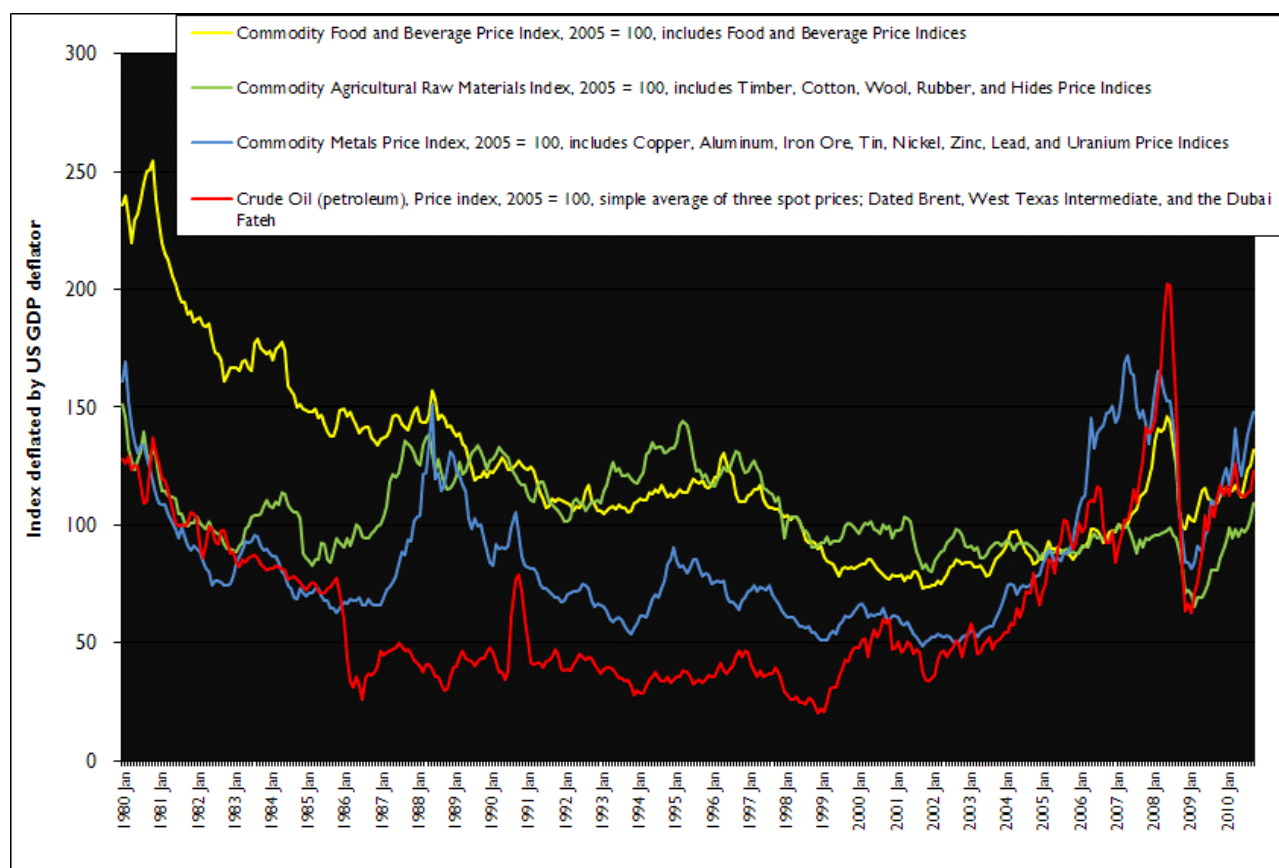
Gilbert uses different techniques to test whether index investment led to price bubbles on futures markets, for agricultural, energy and metal commodities. He found, they did push up the prices — but not by much, and especially so for agriculture.

None of the above analysts have so far been able to take into account latest spike from 2010 in wheat, coarse grain and related soya market etc. However Figure 7 is suggestive of a high level of covariance between movements in food, agricultural raw material, fuel, mineral commodity markets during 2009-10 and is supportive of Gilbert's argument that this is prima



*facie* evidence for financial speculation *amplifying* volatility in these markets. The sharp upward movement on wheat markets began in July and was then followed by isolationist export restrictions, beggar my neighbour behaviour, by Russia in August.

**Figure 7: Commodity Prices Indices (deflated) 1980-2010**



The international rice market, in which annual traded flows are small in relation to huge Chinese, Indian, Indonesian and Japanese stocks, has been much quieter during 2010/11. There are suggestions that these countries as well as exporters are attempting to learn from 2007-8 and are informally acting to avoid fuelling another spike. Speculators risk being seriously punished if any of these parties intervened to calm the market.

Timmer (2009) has also argued that micro decisions amongst self provisioning peasant and consuming households in non- marginal economies could be destabilising in an uncertain domestic market. This effect, reminiscent of the well documented run on the pump behaviour by both commercial and domestic vehicle owners is plausible. This example points back to the issue of changing market structure, notably vertical integration, and information patterns, as a further factors that need to be integrated into market analysis.

The public discussion of the emerging 2010 spike has again focussed on the issue of potentially destabilising financial speculation. The balance of influences behind speculation may be different from those during the 2007-8 episode. One argument is that investment funds are looking for opportunities for higher returns. Bond markets rates are dominated by the effects of quantitative easing and there is a bear market in property related paper. All commodity markets are seen to offer potentially higher returns. Thus, short term markets are dynamic and not necessarily determined by longer term supply and demand relationships or even 'fundamentals'. Accordingly expectations can be influenced by and in return influence what is happening in the forward market. Sellers and buyers expect to receive and pay higher prices.



In this way expectations driven by financial speculation can lead to a bubble (Akerlof and Shiller, 2009).

There is an apparent lack of consensus on the issue of destabilising influences; and the role of financial speculation is unresolved. Furthermore the evidential basis is weak. Is the 2010/11 spike only a continuation of the episode of volatility experienced since 2007 or have markets made a transition to a more extended period of volatility? Those who are instinctively more neo-classical or neo-liberal emphasise theoretical arguments to support the view that financial speculation is unimportant and markets broadly reflect fundamentals. Those of a more Keynesian and European interventionist persuasion find evidence to support the opposite position that markets are in the short term influenced by sentiment or animal spirits. Critically the first position suggests policies to improve market functioning such as through more widely disseminated information or deepening markets by development of new trading vehicles such as warehouse receipts. The latter are more inclined to favour some regulation of forward markets and the use of trade and stock based interventions to limit volatility.

## Annex B: Price volatility and risk frameworks: Bangladesh<sup>33</sup>

In this Annex we consider how global food price volatility has become a major policy issue for Bangladesh. We look at how price spikes relate to the management of other natural hazard risks and the available instruments to mitigate the effects of food price volatility on poverty.

### Vulnerability to price volatility: the 2007/8 shock and after

Bangladesh is extremely vulnerable to multiple natural hazards, as well as economic shocks such as from fuel and food price spikes. As the 2007/8 price spike showed, global food price volatility is a major issue for a country which is a net importer of rice, wheat and other basic foodstuffs (oil, pulses), and in which domestic prices are closely linked to international markets. Rice accounts for around 90% of staple consumption. So when domestic prices rose by over 65% during the period of July 2007 to June 2008, this had serious inflationary consequences. The price rise impacted especially severely on the poor, for whom rice is on average a third of expenditure. With a high concentration of consumption expenditure around poverty lines the percentage of people in poverty that had fallen from 49% in 2000 to 40% in 2005, rose to 42% in 2006/7 and to 46% in 2007/8 (World Bank, 2008). Those in extreme poverty were worst affected. There were severe negative effects on nutrition and child development.<sup>34</sup>

With the 2007/8 spike began a period of extreme domestic price volatility<sup>35</sup>. In 2008/9, with a surge in production and higher imports there was a precipitate fall in prices. Subsequently there has been an abrupt reversal with wholesale prices in the year to 2<sup>nd</sup> December 2010 increasing by 52%. Wheat accounts for 10% of staple consumption; traded global prices and flour (*atta*) were 54% above levels in December 2009. These sharp price reversals imply difficult to manage fluctuations in average real incomes of the poor of 8-11%, and more for the poorest. This cobweb-like volatility also makes more uncertain the position of agricultural producers, especially those more at risk to flood and storm damage.

Imports of rice increase substantially in the year of a poor harvest - after the floods of 1987/8, 1988/9, 1998/9 and 2004/5. Imports rose from c.700 thousand tonnes in 2006/7 to 2.5 million tonnes in 2007/8, falling to 1 million tonnes in 2008/9 and 92 thousand tonnes in 2009/10. Rice imports were projected in June to rise to 1.3 million tonnes in 2010/11. Wheat imports, historically important because of large scale food aid availability, are highly sensitive to the overall food situation. After the lifting of the ban on private importing in 1993, the private sector has played a growing role. It was responsible for 54% of 3.36 million tonnes of wheat imports in 2009/10 and 38% of rice imports up to 2<sup>nd</sup> December 2010.

<sup>33</sup> This sections draws heavily on the consultative review of price volatility and Bangladesh undertaken in 2008-9 by the BIDS and others with support from DFID. The final product was a series of BIDS policy briefs and two of the key authors summarised the findings from the whole review in contributing to the wider FAO review of the 'Rice crisis' (Deb and Hossain, 2010). The review has been updated to take account of the 2010 spike.

<sup>34</sup> Families spent more on food and a larger proportion of their food money on rice, rising from 45% to 50% in rural areas and from almost 30% to over 40% in urban areas. Wages increased, but not enough to fully offset the food price shock. As real incomes dropped, people coped by substituting rice for other more nutritionally valuable foods, and overall food consumption fell; with likely serious short and long-term impacts on the nutritional status of children. The prevalence of wasting (acute malnutrition) among 2 to 5 year olds in rural areas rose from 17% to 23% between 2006 and 2008 (an increase of 34%). In urban areas it rose from 14% to 21% (an increase of 47%). Extrapolating from these findings 650,000 additional under-five children in Bangladesh became wasted largely as a result of the higher food prices. The food price rises resulted in high school dropout rates, especially girls. In rural areas, almost 88% of female headed households reported that their children had to quit school because of the food price rises, compared to 57% of male headed households. (Matin, *et al.*, 2009)

<sup>35</sup> In the eight years 1999-2006 domestic rice prices had been relatively stable, as had growth in production. There had been unprecedented sustained GDP growth despite the flood disasters in 2000 and 2004. There was an upward trend in commercial sector rice and wheat imports unconstrained by global market conditions.

Import price volatility has important implications too for public expenditure because of food grain market operations largely linked to social protection<sup>36</sup>. The projected pattern of imports in 2010 implies around landed costs of some \$ 1 billion and including \$400 million in public expenditure at pre July-August spike prices whilst excluding food aid. These imports with increased wheat and rice prices would cost an additional \$100 million in public expenditure.

Because of the higher domestic prices, actual private and government imports are running in excess of projected levels, implying higher expenditure. There may be negative effects on economic growth if private food imports crowd out other imports.

### **Domestic-international price linkages**

First, to remove doubts about the substantive relationship between international and domestic prices, the behaviour of internal prices for rice and wheat is compared with that of the common sources of imports since 2000. The direction of causation is implied by the scale of Bangladesh imports being insufficient to influence significantly price formation in these markets – India, and Thailand for rice, and also the US exports of wheat. Rice prices have closely tracked, but were typically until 2007 below those in the highly managed Indian market. The closeness of the relationship is shown in Figure 2 and is confirmed by a simple regression of Bangladesh on Indian prices (Figure 11 and Table 11). The ban on Indian exports in 2007 coincided with the higher disaster-related demand for imports in Bangladesh. Prices then rose abruptly above Indian levels in the rice price spike towards the exceptionally high Thai export price levels. Subsequently Bangladesh prices have been substantially more volatile than in India, exhibiting, as already noted, a cobweb-like fluctuation. Higher prices encouraged a surge of production of rice in 2008/9 (8.1%). This improvement in supply, rising stock levels and lack of export possibilities, was then associated with a collapse in prices and a substantially reduced reported increase in output in 2009/10 (3%).

Economic growth augmented demand, and with lower stocks and minimal imports, there were substantial increases in prices in 2009/10. Immediate pre harvest prices in late November/early December 2010 were around 50% above the level 12 months previously. The domestic food policy cycle is strongly influenced by the effects of international volatility indicated in the rise and fall in Bangladesh prices above Indian levels (Figure 8)

Domestic wheat prices have similarly tracked international prices, usually being above Indian and US export prices, reflecting transport costs (Figure 11, Table 11). Domestic production declining through competition from irrigated *boro* rice and also maize for livestock feed accounted for less than a third of supply in 2009/10. However, imports were at a record level of almost 3.6 million tonnes, 85% privately imported. Again import levels and prices have exhibited considerable volatility since 2006/7, especially compared with Indian markets. The increase in wholesale wheat flour (*atta*) price in the year up to 3 December has been 54%.

Wheat is more significant for urban consumption. Social protection programmes established in response to the 1974 famines largely directly distributed wheat; and so wheat continues to be a substantial part of public distribution. Imports for 2010/11 were projected to increase from 3.3M to 3.7M tonnes, % above 2009/10 levels. The extreme volatility in wheat is especially serious for poorer urban consumers and raises issues too about social protection policy.

### **What is happening in Bangladesh in 2010/11?**

December is a key moment: following normal seasonal movements, rice prices would be expected to fall with the *Aman* (main monsoon) harvest. However, as of 2<sup>nd</sup> December 2010 prices were around 50% above those of 12 months previously. Prices had also risen well above the levels that would be predicted on the basis of well-established links to global markets through import parity prices<sup>37</sup>. There is uncertainty about global markets too. From a

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<sup>36</sup> Public Food Distribution includes not only the poor but also assuring stable, typically subsidised availability of basic foods to 'essential' or 'priority' groups such as the military, large scale manufacturing workforce, etc.

<sup>37</sup> When Dhaka wholesale price is regressed on either Indian or Thai prices for rice, then there is a very strong statistical relationship (Table 11). Actual price levels in 2010 continued to rise above the estimated levels on the basis of either Indian or Thai prices (Figure 8). These relative price movements are suggestive of an increasingly tight

Bangladesh perspective these uncertainties underscore the high level of risk with regard to global food price volatility and the outcomes of coincident domestic production weakness. Neither private sector nor government maintain high levels of stock in relation to annual marketed volumes.

### **Disaster risks: a layered approach**

There have been considerable efforts during the last decade to develop a national strategy for risk reduction. This includes a more coherent structure for management in place of the complex institutional arrangements that were the product of decades of addition and modification (Bangladesh, 2010). The Directorate of Disaster Management and social protection and relief operations are now within the same Ministry (Figure 12). The strategy recognises food security in the context of social protection. There is no explicit consideration of problems of price volatility. The strategy had been elaborated in a period of relative price stability with availability to be assured by imports or 'self-reliance'. In the light of events since 2007 there is a need to consider price volatility.

Should the transmission of food price volatility be addressed, and if so, how? In considering how price volatility actually is or can be better incorporated into wider disaster risk management, it should be recognised that disaster risks are an area of highly incomplete knowledge. More recent assessments focussing on the complications of environmental change and economic development have drawn attention to these uncertainties and the limitations of estimating risk from historical data. This problematic of hazard risks is illustrated for tropical cyclones and related storm surges in Table 12 in the form of a Stirling matrix.

Natural hazards and food price risks are presented in terms of layers of risk in Table 4. This category is based on the implied annual probability of events calculated from recent incidence of extreme systemic shocks. The risks posed by the two potentially most serious hazards – flood and cyclone – are apparently high and likely to be underestimated if probabilities and outcomes are based wholly on historical data. In contrast, drought risk has apparently been declining as a consequence of technical changes in agriculture – the widespread shift to powered-lift irrigated *Boro* (winter/dry season) rice.

The National Disaster Reduction Plan categorises the main forms of hazard and lists extreme events since partition in 1947, but makes no clear statement about current formal levels of risk (Bangladesh, 2010). The fullest attempt so far to determine the potential consequences of climate change for agriculture and indirectly the wider economy suggests increasing risks, but stresses the high level of uncertainty regarding its estimates of the main hydro-meteorological hazard risks (World Bank, 2009).

An exploratory assessment for Bangladesh is based on the incidence of what are widely agreed to have been extreme, systemic events (Bangladesh, 2010; World Bank, 2008). This assessment indicates that extreme monsoon (river) flooding, intense tropical cyclones with storm surges and also exogenous GFPS are all high risks (Table 3). There is an ever higher likelihood of localised covariant risk, e.g. flash floods and erosion occurring on an annual basis. Drought risk is much diminished, and with the localised effects of climate change, also extremely uncertain.

Where both probabilities and outcomes are imprecisely understood, this is further justification for categorising flood, cyclone hazard and price shocks as high risk and adopting a precautionary approach to managing these risks. The 'precaution' is to assume the actual risks are not less than the estimated values based solely on available quantifiable information (Stirling, 2007; Mitchell, 2009).

High risk categorisations imply that such events require a constant level of preparedness and a capacity on the part of all that are potentially affected – individuals, groups and the nation state – to minimise impacts. This in turn implies those potentially affected having capacity or

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domestic supply situation, in contrast to neighbouring Indian markets, where prices have been falling in anticipation of a good Monsoon rice harvest.

enabling those economic actors to enhance capacity to cope with variability on a normalised basis, and to internalise risks through self-insurance. The focus of public action should be first to assist decentralised absorption of such risks, enabling in particular poor people and those threatened with poverty to continue to participate in economic development. This could include any of the categories of action identified by Galtier (Table 2). Second, public action should include ensuring a continuing capacity on the part of government and civil society to engage in both anticipatory mitigation and additional responsive measures as required.

The argument against a precautionary approach is that it is more costly than rational choices based on 'expected values'. There is a difficult problem of striking a balance between increasingly costly measures to minimise negative outcomes and sustainable levels of public expenditure. This is especially so in a low income country when part of internalising risk may include establishing contingency reserves, the financing of food security stocks or stockpiles of material for disaster response. That tension suggests adding macroeconomic level measures to the range of public interventions suggested by Galtier (Table 2). Where disasters have societal and economy-wide consequences, the international community may have both a humanitarian role and in augmenting the resources available in limiting the developmental impacts of a systemic disaster.

### **Risk frameworks: floods and food price spikes**

Does the management of exogenous food price shock acquire a special and separate framework for risk minimisation? Alternatively, can price shocks be broadly accommodated within the existing framework for high risk hazards? Bangladesh is an especially important case because, as a populous, low income country, poverty head count 56 million in 2005, it is demonstrably sensitive to international price volatility. Bangladesh is also widely regarded as having become more successful in limiting the social and economic impacts of such natural disasters, especially extreme monsoon flooding and tropical cyclones, whilst sustaining growth and poverty reduction since the 1991 cyclone and the restoration of multi-party democratic government. To initiate an exploration of this potentially complex issue for the case study countries, the analysis is simplified to compare the management of monsoon flood, arguably the more systemic of higher risk hazards, with the additional response to the 2007/8 spike. Again, to simplify the exploratory analysis the focus is more on rural poverty reduction, in part because urban poverty is still less closely monitored and understood. The stated objectives of development policy, and more specifically disaster risk reduction are to promote and sustain poverty-focussed development (the MDG; the Poverty Reduction Strategy, Natural Disaster Reduction Plan, etc.)<sup>38</sup>

The whole range of public actions that are recognised as contributing to reducing extreme flood risks can be organised in terms of four categories broadly equivalent to those proposed by Galtier for reducing food price instability. These actions are compared in Table 5 with those that were part of the response to the 2007/8 food price shock. Category A measures aim to facilitate normalisation of flooding outcomes and enable those potentially affected to retain risks. Category B includes risk transfer and Category C includes government measures to limit impacts of extreme flooding on the productive economy and assist recovery. Category D measures include all forms of social protection. There are also macro-economic measures (Category E), which aim to limit the economy-wide impacts of the shock.

#### **Category A: facilitating normalisation and risk retention**

*Flood risk:* Information about risks and impending threat is a necessary condition for rational decentralised decisions. The provision of information as a public good has made considerable progress. This is more evident and demonstrably successful for cyclone and storm surge threat, with a decline in cyclone deaths. The Directorate of Disaster Management provides daily alerts on river level status, and these are widely disseminated with the spread of IT and

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<sup>38</sup> If there are trade-offs between economic development narrowly defined as maximising growth and poverty reduction, then the analysis is more complicated. For example, measures to sustain agricultural growth might involve a trade-off with social protection through subsidising consumption. High levels of recurrent expenditure on social protection, depending on how this is financed, could be inflationary or crowd out public investment in infrastructure.

broadcast media. Decentralised responses include the organising activities of NGOs and local governments and not just individual actions. Again much lower than reported fatalities from recent extreme monsoon floods in 2004 and 2007 suggest that people are better informed of impending threats. Early warnings and their wide dissemination have been increasingly effective.

Flood forecasting is constrained by limited regional co-operation on the part of neighbouring upper riparian states<sup>39</sup>. Funding levels have also not been sustained for river hydrology and rainfall related flood dynamics research and monitoring following the completion of aid supported projects under the Bangladesh Flood Action Plan and the following Master Plan exercises.

The emergence of relatively stable and functioning financial networks for the flow of funds in post-independence and post-conflict Bangladesh facilitates post-disaster recovery and reconstruction (e.g. housing), and the maintenance of economic activity despite flood shocks. Migration of household members is self-insurance. The increasing ease of making internal and international remittances is of relatively greater benefit to the less poor.

Civil society organisations have come to play a substantial role in providing information in forms accessible to poor people, as noted above, and to be better informed to provide assistance (social protection). Civil society partially and imperfectly (for example because of patchy coverage) fills a void caused by there being extremely weak governance at decentralised levels. However, as assessments for recent disasters demonstrate, tens of millions of people are still unable to cope with an extreme flood without direct and massive scale public assistance.

### **Food price risks**

The institutional analysis of grain markets confirm broadly that these are well integrated and, with the removal of some of the restrictions on importation, interlinked with international markets. There is probably scope for interventions to facilitate further integration such as those widely discussed to encourage commercial market actors in Africa. Financial instruments for rice similar to warehouse receipts could make the market more liquid (Table 5). There is also considerable scope for regulation directed to improving the quality of storage (Cookson, 2008).

Government collection and reporting of production, consumption storage and market prices through the Bureau of Statistics (BBS) could be improved and made more transparent. The Ministry of Food and Disaster Management under internationally supported programmes provides regular updates information on domestic and international markets through *Fortnightly Foodgrain Outlooks* for stakeholders, including civil society and agencies. However these are frequently subject to delay and require high level MoF approval.<sup>40</sup>

IT networks and public media make this information and that from international sources rapidly and widely available to traders, suppliers and the literate consumer. It is conjectured that this rapid and widespread dissemination of information about both domestic and international markets could lead to micro-scale but, but widespread, herd behaviour that could accentuate price volatility (e.g. Timmer, 2008, 2009). The issues raised by increasingly available but asymmetric and partial access to information should be and probably are under investigation<sup>41</sup>.

<sup>39</sup> India did not provide an advance warning of the 2000 flood that originated in West Bengal. This was the first extreme flood disaster in living memory in some western districts of Bangladesh and so there had also been little preparedness.

<sup>40</sup> As of 14<sup>th</sup> January 2011 the most recent publicly available report is No 60 of 7<sup>th</sup> December 2010, posted two weeks later

<sup>41</sup> One of the author's anecdotal experiences of Bangladesh during the famine of 1974/5 was that consumers who could hold stocks well beyond their requirements to sustain a few days of family rice consumption.



## Category B: Risk transfer

Arrangements for risk transfer are intended to reduce instability in income streams, and so consumption. The recent literature on disaster or price risk transfer can sometimes convey the impression that promoting market based instruments is a “new” approach to managing instability. Natural hazard risk transfer arrangements were an aspect of the ‘traditional’ or pre-modern rural economy in Bangladesh: share cropping, long-term semi-feudal labour contracts and widespread forward contracting for harvested output between farmer and trader. The decline in such practices in a market transaction mediated economy has left a gap in institutional arrangements for risk transfer, including producers, labour and providers of services, including traders and those dependent on incomes from assets or social welfare<sup>42</sup>.

*Flood risk* There is a near complete absence of commercial or formal market mediated risk transfer within the rural economy. Similarly conventional flood insurance is virtually unavailable in Bangladesh. The numbers are simply discouraging: there are covariant risks, and the uncertainty about hazard frequency and intensity would inevitably require very high premiums.

There is limited flood insurance coverage even in developed industrial economies, except where systematically subsidised (e.g. USA). The well documented problems of basic risk (genuineness of claims), moral hazard and covariate risk are formidable obstacles to a viable market directed to poverty reduction and successful public intervention (Arnell, 2000).

In the close observation of institutional behaviour it is often useful to distinguish between ‘formal’ and ‘informal’ practice. The micro-credit revolution has drawn a large proportion of the poor, if not the poorest people, into subsidised commercial credit transactions. Assessments of the way micro-credit is used and functions as a system through periods of shock suggests that these contracts have become *de facto* a significant form of risk transfer. Credit is used for consumption, the payment of other private debts to prevent asset loss, and to replace lost assets, according to post-flood surveys. Beginning with the aftermath of the 1998 floods the major micro-credit programmes have been refinanced by central bank accommodation and with international support. The initial rationale for refinancing was in part that these financial intermediaries had become too big to fail!

Historically disasters in Bangladesh and the Indian sub-continent triggered the highly politicised write-off of agricultural credit debts, and the extension of *taccavi* recovery loans (see below) with little anticipated prospect of recovery to mostly to non-poor farmers. The relatively high repayment rates for micro-credit and the low transaction costs of extending further credit through existing arrangements to very large numbers of poor people is *de facto* a comparatively successful form of subsidised commercial risk transfer.

*Food price volatility:* There is a paucity of research or in-depth investigative journalism on the commercial sector and its risk transfer practices. The 2007-8 price spike provoked widespread allegations of speculation, collusion and hoarding, but little substantive analysis. Doubtless some speculative holding of stocks was highly profitable. Deliveries times are short and the trade seems to pass on risks by confining itself to spot and early delivery transactions and retaining low levels of stocks. Analyses by Cookson et al (2008) suggest that there is little evidence of widening margins. They also argue for Category A measures to improve information and to make the market more liquid should be complemented by new instruments for forward sales, including *forward contract, futures, pull and call options*.

The food marketing authorities were doubly unprepared for the coincident disaster shocks and food price spike in 2007. Stock levels were inadequate to more than partially cover public distribution (see below Category D). Government and those advising on food security policy had come to anticipate between 1999 and 2006 that Bangladesh could allow commercial trade

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<sup>42</sup> The proportion of rice that is marketed is estimated to have increased from around 30% in the mid 1970s to around 65% in the 1990s (Ahmed, *et al.*). Clay (1976) for example documented a collapse of traditional labour contractual arrangements during the 1974 famine.



and public imports from the relatively stable international market to meet unanticipated food supply problems and sudden onset disaster shocks.

*Public risk transfer:* The World Bank (IFC) has pioneered international and national level consultations exploring the scope for government to use commercial risk transfer through instruments such as catastrophe bonds. There were inconclusive informal discussions in Dhaka in 2001-2. Possibilities for resort to the commercial reinsurance market are limited by the high risk and uncertainty associated with extreme natural hazards, issues of governance and a lack of evident interest in such paper within the re-insurance market <sup>43</sup>.

### **Category C: agricultural production and market interventions**

Food production: since independence government has intervened to support to post-disaster recovery of agriculture. This is additional to employing the instruments used in encouraging productivity through input subsidy, credit provision, supporting diffusion of improved varieties. There is also public infrastructural investment in flood control, drainage and irrigation. In 2007/8 measures to boost production included credit, input support and irrigation subsidies. The Bangladesh Bank directed private banks to increase agricultural credit to meet working capital of small and marginal farmers, especially in areas affected by flood and the cyclone. Commercial banks without rural branch networks channelled credit through NGO mass credit operations. Disbursements increased by over 16%. Government also subsidised diesel for irrigation pumps and maintained a 20% subsidy on electricity for irrigation.

The combination of high prices, favourable weather and these measures contributed to a 15% increase in *Boro* rice output in 2007/8. Despite the flood-cyclone losses, total rice production is estimated to have increased by 6.2% in 2007/8, and then by 10.1% in 2008/9 (Deb et al., 2009). In 2009/10, a largely disaster free year, but for many commercial growers disincentive level prices, output rose only by 1.2%. However GDP grew overall by 5.83%, and the combination of increasing consumer demand, a tighter domestic food supply situation and rising international food and petroleum prices appears to have fuelled food and general inflation.

Government intervenes in grain markets only to reduce rather than control price instability and to procure food for distribution programmes. The government sets procurement prices and limited buying targets. The initial target for 2010/11 was 1.6 million tonnes (equivalent to 5% of rice and wheat production in 2009/10) and also close to the average percentage level since 1993/4 of procuring 4% of domestic production. In response to rising wholesale prices, already above the procurement price, government abandoned in November its 200,000 tonnes target for the 2010/11 *Aman* season in favour of higher imports to ameliorate supply pressures. This reaction is indicative of the limited effectiveness at present of government procurement in moderating price volatility.

Government reduced from the mid 1990s the range and scale of its 'normal year' distribution and stock holding mostly sourced with official imports of rice and wheat. The 1980s food grain stock holding capacity of some 1.8 million tonnes was reduced to under 1 million tonnes (check?). Public distribution cuts included a poorly targeted and leaky ration system. Monetised distribution for special groups (e.g. army and some large employers) was maintained and has been actively used when market prices are high, for example rising in 2008/9. There is a large scale complex of social protection programmes directly distributing food discussed below under Category D. An open market sales (OMS) window is used, especially at times of high prices. However in 2007/8 and 2008/9 respectively, only 268,000 tonnes and 195,000 tonnes were sold compared to 408,000 tonnes in 2006/7 due to supply constraints and relief enhanced requirements. Government has a fair price card (FPC) which normally includes some 1.1 million poorer urban consumers. Overall food grain operations continue to be substantial in relation to marketed commodities, around 15%, some two million tonnes in 2008/9 and 2009/10, compared with 12 million tonnes of rice and over three million tonnes of wheat in 2009/10. The data especially on production but also marketed volumes of

<sup>43</sup> Section 8 international initiatives in public risk transfer have so far been heavily subsidised.

grains, private stocks are widely recognised to be poor and subject to administrative influences. Consequently a recurrent recommendation in evaluations and food policy analysis is for improvements in the quality and timeliness of statistical information on the food economy<sup>44</sup>

To encourage commercial imports during periods of shock and potentially tight supply, government has used trade measures. Following earlier moves to deregulate and reduce tariff barriers, in March 2007 government eliminated tariffs on rice, wheat and essential foods. Commercial importers were no longer required to renew VAT registration on an annual basis. Government also banned export of non-scented rice.

The underlying asymmetry within the food trading system is about an incapacity to export even when domestic prices fall towards or below export parity prices of exporting countries. Bangladesh has been an efficient producer at import parity prices prior to the onset of price volatility in food, fuel and fertilizer prices in 2006/7. However, it has been uncompetitive at export parity prices. The transaction costs of being organised to export intermittently also preclude exporting except on an unrecorded basis. The subsidy costs associated with being in structural surplus (cf. India) are prohibitive. The efficient management of substantially higher levels of stocks would be a considerable institutional challenge for the public and private sectors.

The instruments available to government are many, but cumbersome, especially in the case of the multiple distribution channels. This multiplicity of instruments reflects a complex of political and social influences and goals. The period 1993-2006 was one of liberalisation, whilst maintaining a considerable capacity to scale up food-based social protection in face of crisis. The high levels of commercial wheat imports in 2009/10 (3.3 million tonnes), a response to rising domestic cereal prices that preceded the July-August surge in global prices could appear to demonstrate the success of this policy (Figure 11 and Table 11). Since 2007 there are indications of increasing concern about national food security which will possibly lead to a more precautionary approach, including holding larger stocks and encouraging private stock holding.

### **Category D: Social protection**

The Public Distribution System has been at the centre of government's strategy to use safety nets to combat chronic poverty and limit the impacts of natural disasters and other shocks on the income of poor and affected groups. The monetized channels, as already discussed, which target 'priority' groups and poorer urban consumers: include Essential Priority, Other Priority, Large Employee Industries, Flour Mills, OMS, and FPC. The non-monetized channels, which directly distribute food to beneficiaries, that have had a more rural focus, include Food for Work (FFW), Test Relief (TR); Gratuitous Relief (GR), Vulnerable Group Feeding (VGF), Vulnerable Group Development (VGD) and Food for Education. These are all continuing programmes that target the chronically poor and can be expanded to respond to a systemic disaster, as they were following the 2007 floods and Cyclone Sidr.

The complex array of safety net instruments reflects the history of policies on food and social insecurity in Bangladesh. The major direct distribution channels, FFW and VGF/VGD were introduced in response to the 1974 famine and hyperinflation, and displaced failed monetised channels, rationing and Pakistan era cash based rural works. The poorest consume a very high proportion of income and food as rice (and/or wheat).<sup>45</sup>

Food based safety nets provide some assurance of physical access to food and against price volatility. Those channels, and for a period WFP supported Food for Education, conditional transfers to families of girls registered and continuing in primary education, were largely resourced through large scale wheat food aid, varying annually from over 1 million and up to 2

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<sup>44</sup> The imprecision of these figures reflect the lack of accurate data for marketed rice; for example, Deb and Hossain (2010) put it at 10-12 million tonnes c. 2005 for the commercial market. However some estimates suggest that as much as 65% of rice consumed involves a financial transaction (Ahmed, xxxx).

<sup>45</sup> Test Relief and Gratuitous Relief are a continuation from the pre 1947 Famine Code; there are annual commitments in advance to be used in response to localised covariate shocks, such as flash floods, as well as scaling up after an extreme natural disaster.

million tonnes following a crisis. Since 2000 food aid has been progressively cut back, necessitating alternative resourcing through government procured rice and commercial imports. In 2009/10 food aid was less than 45,000 tonnes.

Since the 1990s there have been pilot safety nets schemes that made cash-based transfers. The VGD, which targets female-headed households, has included cash-based transfers. The '100 Days Employment Generation Scheme' was launched in 2008-9 specifically targeting the ultra-poor and marginal farmers by group and spatially in areas that most seasonally food insecure or prone to river erosion. Initial assessments are positive but indicate serious problems of inclusion and exclusion error. Relevant in the context of this paper, the 100EGP was launched during the price spike, but initial operations were in a period of rapidly falling food prices.

Cash based transfers require far simpler chains of administration and are easily expanded. However, administratively determined rates are notoriously price inelastic and sensitive to inflation. If internal markets are functioning then in Bangladesh prices should be contained close to import parity levels. A condition of the relative success of India's NEGS is that price volatility is contained by public operations, and physical access to food assured, apart from immediate local disaster-related disruption.

The retrospective conclusion of various investigations into the response to the coincident flood, cyclone and price spike of 2007/8 is that all these safety net interventions and food operations helped to contain this shock. However they were too small and too flawed by weaknesses in targeting to prevent severe impacts on poverty and associated negative impacts on extremely vulnerable groups. Also because of the limited scale of direct transfers and other monetized channels, in aggregate the effect of PFDS operations that had directly on prices was modest.

The SSNs have been relatively successful in making a significant contribution to limiting social economic impacts of disaster shocks. There are well documented and serious weaknesses in targeting poverty the poorest and most vulnerable groups and areas (World Bank, 2008)<sup>46</sup>. The leakages are probably more serious for food transfers because of the many intermediaries. The programmes are organised through multiple parallel institutions.

The re-emergent issue of extreme food price volatility poses special challenges for the complex and cumbersome system of social safety nets. A food price shock is systemic, negatively affecting all households excepting surplus producing farmers. It is widely believed that speculators hoarders and corrupt officials are profiteering, given acknowledged problems of governance. The cumbersome food transfer system depending on procurement and officially organised imports is unable to respond quickly and so is failing to be fully counter-cyclical. The volume of food distributed rose by 67% between 2007/8 and 2008/9, but then falling back in 2009/10 as prices began to rise again.

These multiple channels are not well integrated or coordinated, involving several agencies. The PDFS programmes are the responsibility of the Directorate of Food, which is a parallel department to DDM within the Ministry of Food and Disaster Management. The 100 Day EGP is organised by the through the local government structure and from central government the Ministry of Food and. Other programmes e.g. FFW involve other line ministries. There are the well-documented weaknesses in targeting. Nevertheless, this complex and cumbersome system along with civil society activities and micro-credit has enabled Bangladesh to provide an incomplete safety net against poverty which contains the effects of extreme shocks.

### **Category E: Macroeconomic pressures and measures**

*Disaster shocks* typically impact negatively on sectoral product, especially agriculture and GDP. An exogenous but internal shock, which destroys assets, inventories and reduces output, is a threat to sustainable growth and overall poverty reduction goals. The Ministry of Finance and

<sup>46</sup> 41% of beneficiaries were found to be non-poor (in top three quintiles of income). Only around 40% of VGD/VGF transfers reach the bottom quintile (World Bank, 2009). Given the low rates of coverage and small scale of what is being distributed relative to calorie requirements (Matin *et al.*, 2009), these errors of inclusion and exclusion are high.

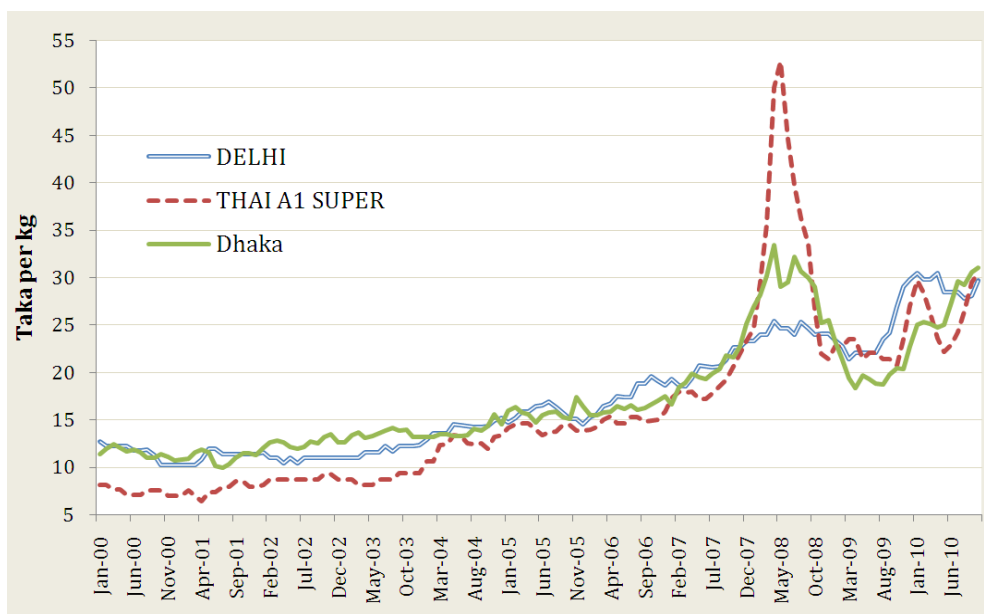
the Bangladesh Bank have been expansionary following each major flood disaster since 1998 to minimise the direct economy-wide shock to growth. The accommodation by the Bangladesh Bank of micro-credit institutions, mentioned above, has been considered necessary. Part of the public financial response is adjustment: reallocations to relief and reconstruction within the existing budgetary envelope. IFIs such as the ADB have also provided additional funding, but again part of the external response has been to reallocate from underspends or to bring forward expenditure on existing commitments within the aid pipeline (Benson and Clay, 2001).

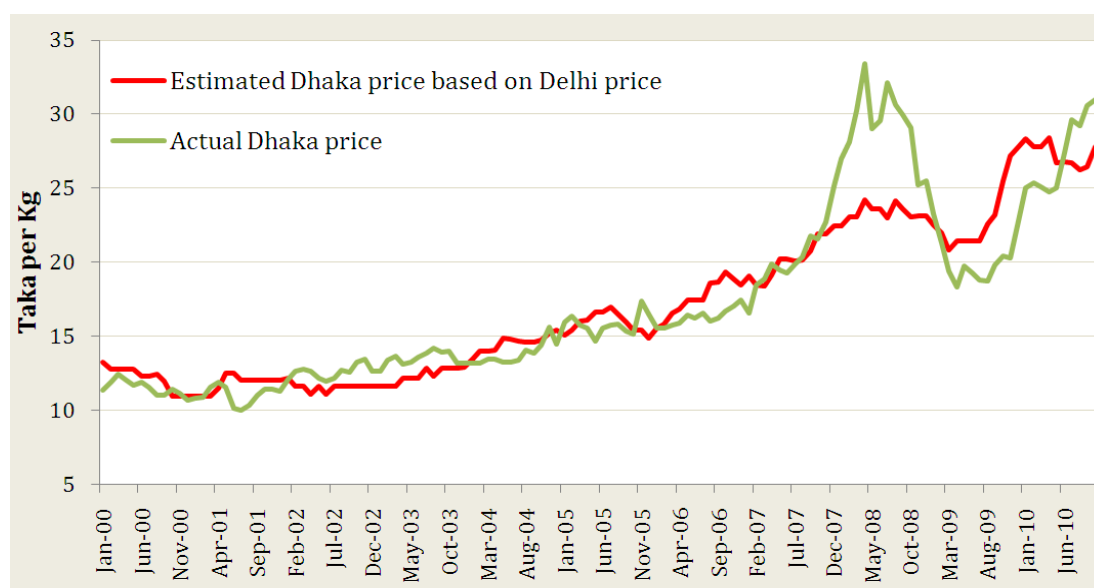
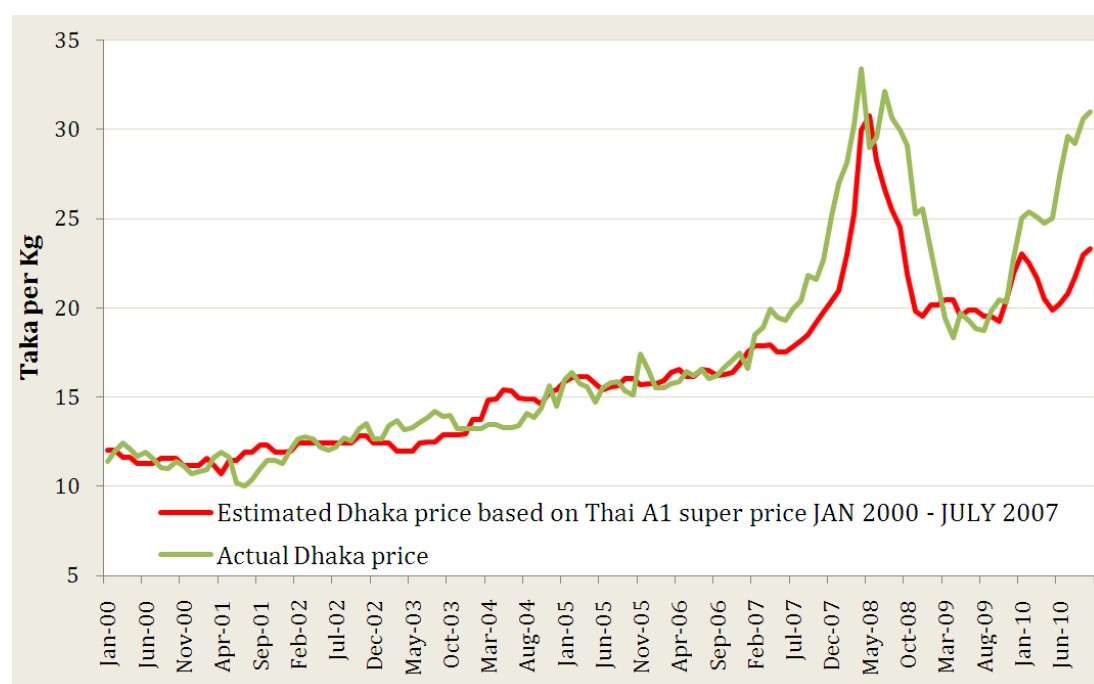
The private sector financial response includes sustained and high remittance levels sustaining private consumption and recovery.

The overall consequence has been to minimise the shock, with the combined overall effect of the flood and cyclone shocks of 2007 estimated as reducing GDP growth by around 1% only in 2007/8 followed by a recovery in 2008/9 (World Bank, 2010). The industrial and service sectors were little affected. The changing structure of the economy has made it much more resilient to natural hazard shocks than in the 1970s-80s. Nevertheless the distribution of impacts is regressive, necessitating more effective social protection measures.

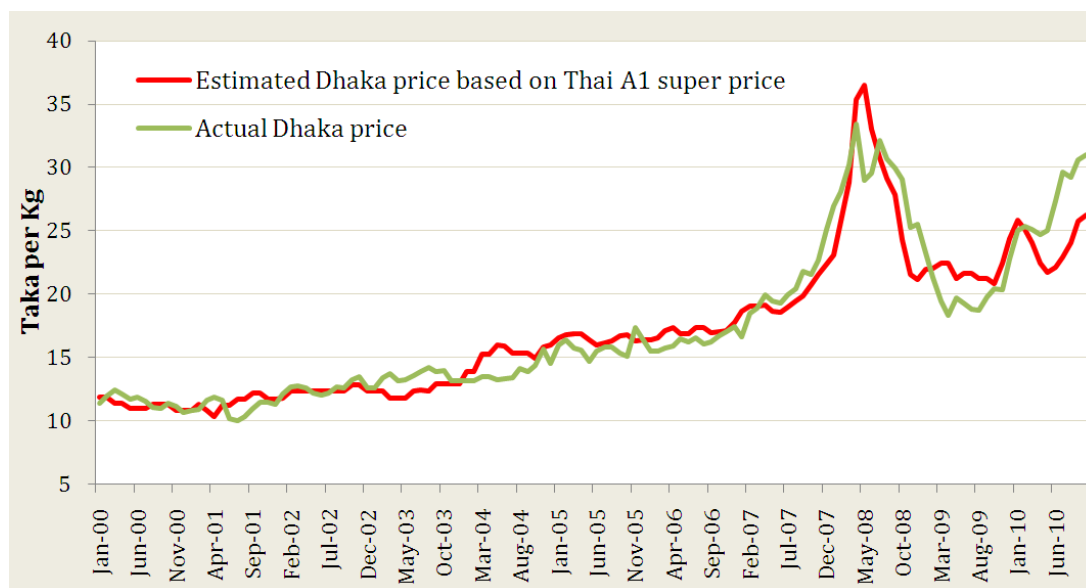
An external food price spike as in 2010 is in contrast inherently both inflationary and extremely regressive in its impacts on poverty. The effects on real incomes and increasing import costs are potentially negative on both private consumption and aggregate expenditure. The increasing cost of PFDS imports and increased levels operations and other social protection measures also have to be financed. The balance between expansionary measures and adjustment to contain inflationary pressures is more difficult than in the case of a disaster shock.

**Figure 8: Dhaka, Delhi & Bangkok Rice Prices from Jan 2000 to Oct 2010, converted to Taka**



**Figure 9: Actual Dhaka Prices and Regression Estimates of monthly Dhaka prices****a) based on Delhi prices Jan 2000 - Jul 2007****b) based on Thai prices; Jan 2000 - July 2007**

### c) based on Thai prices; Jan 2000 - October 2010



**Figure 10: Regression Analysis of Dhaka prices as a function of monthly *Delhi* and *Thai A1 Super* export prices**

Dhaka prices as a function of	TIME PERIOD	Equation estimated	R-Square
Delhi prices	CONTINUOUS: Jan 2000 – Oct 2010	$P_{\text{DHAKA}} = 0.363 + 0.873 P_{\text{DELHI}}$	0.869
Thai prices		$P_{\text{DHAKA}} = 1.211 + 0.602 P_{\text{THAI}}$	0.915
Delhi prices	PRE SPIKE: Jan 2000 – July 2007	$P_{\text{DHAKA}} = 0.765 + 0.714 P_{\text{DELHI}}$	0.788
Thai prices		$P_{\text{DHAKA}} = 1.43 + 0.502 P_{\text{THAI}}$	0.841

Note: Estimating monthly Dhaka prices as a function of monthly *Delhi* and *Thai A1 Super* export prices – over 2 time periods: Log-linear model:  $P_{\text{DHAKA}} = \alpha + \beta P_{\text{DELHI OR THAI}}$  (where all the Prices expressed in logs)

Figure 11: Dhaka, Delhi and US Wheat prices in US dollars

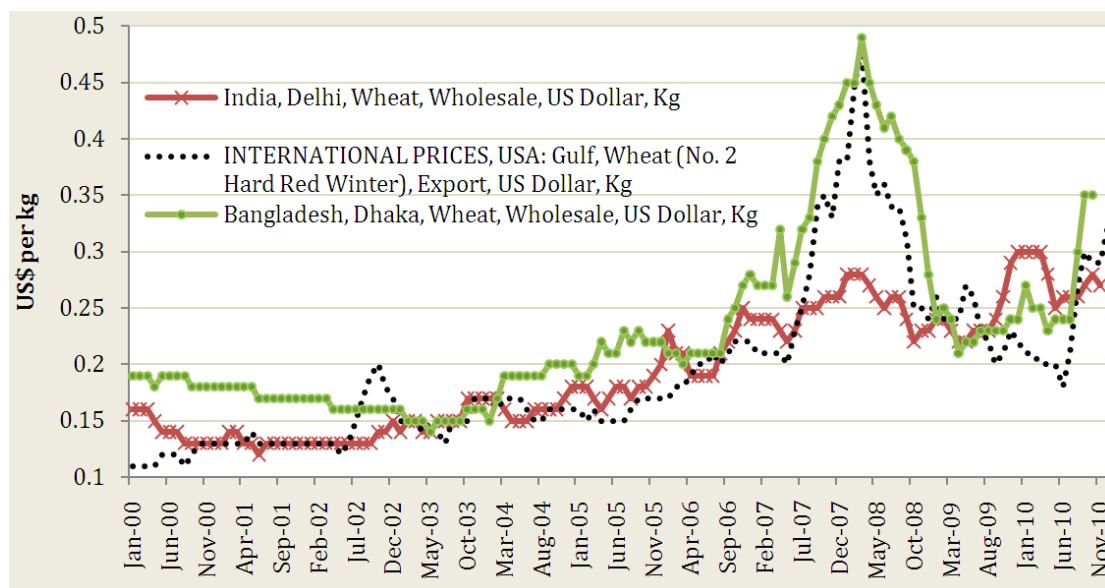


Table 11: Wheat Price Correlations: (for logs of Taka prices)

	Bangladesh wheat	India Wheat	US Gulf wheat	exp.
Bangladesh wheat	1			
India wheat	0.89	1		
US Gulf export wheat	0.92	0.90	1	



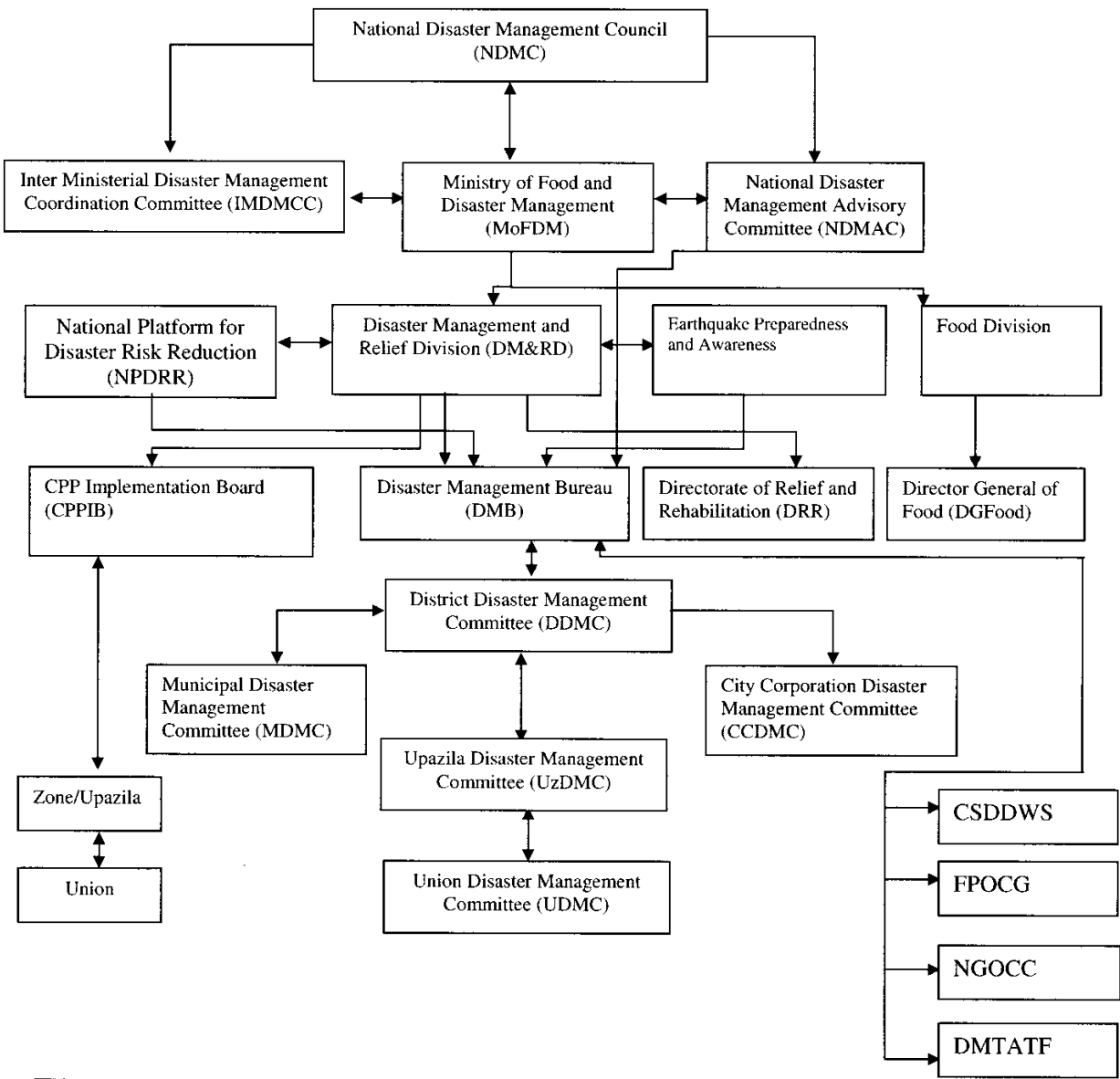
**Table 12: Incomplete knowledge: Disaster Likelihoods and Outcomes in Bangladesh: Extreme Cyclone and Global Food Price Spike Risks**

		Knowledge about outcomes ←-----→	
		Outcomes well characterized	Outcomes poorly characterized
Knowledge about likelihoods ↑ ↓	Firm basis for probabilities	<b><i>Risk</i></b> <b>Cyclone and storm surge risk after 1991 cyclone killed &gt;120,000 people</b>	<b><i>Ambiguity</i></b> <b>Cyclone and storm surge risk before 1970 cyclone killed &gt;300,000 people</b>
	No firm basis for probabilities	<b><i>Uncertainty</i></b> <b>Now: Extreme Tropical cyclone (C4-5) in era of climate change</b>  <b>Now: Global Food Price Spike (GFPS) in 2010-12</b>	<b><i>Ignorance</i></b> <b>Future: Bangladesh cyclone and storm surge risk in era of rapid environmental change.</b>  <b>Future: Joint Risk Of Global Food Price Spike And Natural Disaster</b>

**Table 13: Bangladesh Food Grain System Statistics 2006/07-2010/11**

	2006/7	2007/8	2008/9	2009/10	2010/11
					Projected June 2010
Production	(mn tonnes)				
Rice	28.05	29.8	32.2	33.2	36.5
Distribution	(mn tonnes)				
Monetized	0.706	0.510	0.446	0.591	
Non-priced	0.756	1.050	1.684	1.373	
Total	1.462	1.560	2.130	1.964	2.650
Stocks (end)			1.060	0.530	
Imports	(mn tonnes)				
Rice				0.090	1.320
Wheat				3.370	2.430
Pvt				2.860	
Govt				0.457	
Food Aid				0.044	
Total				3.460	3.750
Procurement	(mn tonnes)				
Aman					0.200
Boro					1.350
Wheat					0.100
Total					1.650
Procurement	(Tk per t)				
Price					
Paddy					17000
Rice					25000

Figure 12: Disaster Management Institutions in Bangladesh



Source: Bangladesh (2010) *National Plan for Disaster Management*, Figure 16

## Annex C: Uncertainty, risk frameworks and food insecurity in Malawi

Background:

### The 2008/9 food price spike and beyond<sup>47</sup>:

The recent trend in Malawi maize prices has been wholly contrary to those in international prices, thus showing the limited degree to which Malawi is integrated into global maize markets.<sup>48</sup> However there is extreme internal price volatility. Domestic staple prices in Malawi are strongly seasonal, with a typical peak in January-March prior to the maize harvest. There were strong upward movements in prices in early 2008 and more so in 2009.<sup>49</sup> However, in the latter case there was a sharp decline following the harvest. The severity of the price spikes in 2008 and again in 2009 of the order of 150% from immediate post-harvest levels must put considerable pressure on vulnerable groups. Again in 2010 the seasonal range has been 60% or more. These price fluctuations are very large given high poverty levels and suggest a need for continuing social protection to minimise the effects of seasonality on both the rural and urban poor.

Malawi previously experienced severe food crises in 2001/2 - 2002/3 and again in 2004/5 - 2005/6. At least three periods of crisis and extreme price volatility within a decade implies an extraordinary high level of systemic food insecurity risk. Issues raised include the following: why are the problems endogenous and so severe? What has been done to address these problems since 2002? Next, focusing specifically on prices, what is being done to address this extreme seasonal variability amplified by both exogenous weather and apparently regional influences. The challenge is not coping with internal price volatility, but rather that of incorporating the management of natural hazard shocks into a framework for reducing the chronic poverty and systemic food insecurity of which price volatility is a primary symptom.

Malawi has been something of a test bed for internationally supported food insecurity initiatives since 2002, reflecting a wider awareness of chronic poverty and food security, and dependence on aid as it has struggled to restructure the economy.<sup>50</sup> Initiatives include the whole range of interventions in the four categories: to strengthen decentralised behaviour, supporting risk transfer with crop insurance and by government, intervening in markets and supporting production through the use of subsidised input packages in recovery and as part of broadening the basis of social protection.

### Spikes, crises and sources of vulnerability

The extent of extreme vulnerability of people to shocks apparently increased during the period from the mid 1980s until around 2001/2. This increasing vulnerability makes it difficult to attribute food crises to precisely defined natural hazard events. That leads us to categorise the food security crises which have affected a large part of Malawian society as *systemic, complex weather related disasters*. The worst manifestations of this chronic and systemic food

<sup>47</sup> Malawi follows a split year – July-June with the main maize harvest at the very end of the year in April-May – and a typical seasonal pattern of prices peaking in the hungry season of January to March, in which even a majority of self-provisioning farming households have exhausted their retained stocks and are obliged to purchase food staples.

<sup>48</sup> The Lilongwe retail price of 32 /kg in December 2010 implies no change over one month, a drop of 27% over one year and 44% over 2 years. The US dollar price equivalent of c. \$210/tonne is some 12 % below the current US export price for yellow maize of around \$ 240 per tonne, The Lilongwe price is some 10% above the South African export price of c. S190/t. Allowing for trading margins that implies that Malawi domestic prices are substantially below South African export prices. The latter are also substantial below earlier prices, about 14% below 2009 and 25% below 2008 prices.

<sup>49</sup> In May 2008 local prices in Lilongwe were reported as Mkw 35.00, 84% above those a year previously MKw 19.00, and rose to Mkw 72 in January 2009 and by May had fallen to Mkw40.

<sup>50</sup> Malawi was forced to restructure its economy to take account of the growing dominance of South Africa in the region, the secular decline in its major export, tobacco, and the slow recovery in its transport links from the conflict in Mozambique. The remittance economy suffered from the loss of South African jobs and then the desperate state of the Zimbabwe economy has been another factor.

insecurity were the crisis of 2001-2, continuing into 2002/3 and the crisis of 2004/5, again continuing into 2005/6. This was also a period of crisis from a health perspective.<sup>51</sup>

Extreme food price volatility is also a clear indication of the severity of these crises, bearing in mind that even 60% of maize producing households are at least partially in deficit.<sup>52</sup> The price spikes are seasonal and reflect the increasing reliance prior to harvest on purchased food.

The data available from GIEWS and supplemented by FEWS only covers the period since 2004. But the previous food security crisis in 2001/2 – 2002/3 was also associated with extreme price volatility (Devereux, 2002; IDC, 2003). The data from 2004 indicate that there were extreme seasonal spikes in 2005 and again in 2008/9 (Figure 12). The volatility is even more extreme in the domestic prices that confront poor consumers: between post-harvest prices in 2007 and the pre-harvest peak in 2009 prices rose by over 300%, falling again by over 200% in the following year (Figure 12).

These extreme spikes reflect the thin markets and low levels of intra-annual and carry-over stocks and behind the markets is the extreme sensitivity of largely rainfed small farmer agriculture on weather and other influences discussed below. The extreme spikes are also a measure of failures by government and the international agencies on which it is so dependent financially to anticipate and to act adequately to contain such volatility in these very thin markets.

Domestic price movements are more extreme than international price volatility, as reflected in movements in US and South African export prices. Nor are these spikes closely associated with the movements in international (US) and regional (S.A.) exporter maize prices (Figure 14).<sup>53</sup> The correlations between Malawi and external prices are weak (Table 12).

Given the effectively open borders, especially with Mozambique, and also with Zambia and Tanzania, further research into markets in neighbouring areas of those countries might clarify whether the spikes were wholly internal (endogenous) or more regional in character. In particular Mozambican as well as Zambian markets exhibit a similar pattern of volatility to Malawi since 2007 (White and Ellis, 2010).

### **Comparing 2001-2 and 2008/9**

The 2001/2 crisis and 2008/9 spike are especially problematic because it is difficult to precisely relate them to specific natural hazard events. Rather, weather related variability in agriculture appears to intensify chronic and systemic food insecurity, whilst flooding causes more localised covariate losses. The sources of this extreme vulnerability are complex and related to widespread poverty, intensified by contingent factors extreme events. There are however important differences between these food crises reflecting some successes in addressing vulnerability since 2002.

Analyses of the extreme, systemic food insecurity in Malawi that contributed to the 2001/2 near famine and a five year period of chronic food insecurity typically include the following influences:

- Widespread environmental degradation associated with smallholders intensifying subsistence cultivation, and especially on increasingly marginal lands.

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<sup>51</sup> Since 1987 epidemics are responsible for more deaths than floods and drought combined. Epidemics would therefore rank as a higher priority risk in terms of the current UN/ISDR definition of a disaster than Floods or Droughts, singly or combined. The most deadly epidemic disasters (other than that recorded for 1989) fall immediately before, during and after the prolonged period of poor weather affected harvests and flood during 2001 – 2005. (Hay and Phiri, 2008)

<sup>52</sup> Some 10% of maize growing holding are in surplus and 60% in deficit (SOAS, 2007)

<sup>53</sup> The retail price of maize in the capital, Lilongwe, rose in the immediate pre-harvest period of March-April from around US\$150 to over \$450 per tonne between April 2005 and April 2006, and again from under \$150 in April 2007 to over \$300 in April 2008, and over \$400 in 2009 before falling post-harvest to around \$300 in 2009, and to around \$160 in 2010.

- Limited adoption of yield improving inputs, especially in subsistence maize cultivation. Other attempts at more diversified small farmer production (notably cassava) were also less successful than officially reported.
- Growing reliance of rural households, partially and highly seasonally, on markets for basic foodstuffs.
- Diseases, especially HIV/AIDS, but also increased incidence of malaria, and locally bilharzia, reducing capacity of the workforce, and leaving households often grandmother and their orphaned grandchildren without adequate means for a livelihood.
- Slow incomplete rehabilitation of international transport linkages through post-conflict Mozambique contributing to high import parity and low export parity prices, and also extended lead times for organising imported food.
- Weakness public marketing institutions in the wake of liberalisation and with poor governance (see below).

There were the additional effects of external shocks on the Malawian economy. The loss of income opportunities and remittances, especially from Zimbabwe. The rapid decline of Zimbabwe's economy turned this country from being a periodic exporter to structural food deficit. The full reintegration of South Africa into the regional economy had continuing negative impacts on industries and livelihoods that had been sustained in the absence of South African competition through the Apartheid era. The secular international decline in tobacco resulted in increasing weakness in the market for Malawi's main export crop. This accumulation of interacting negative influences made Malawi by 2000 amongst the poorest, food insecure, disaster prone countries.<sup>54</sup>

### **The 2008/9 food price spike**

International price movements since 2006 appear not to be an important direct contributor to domestic price volatility in Malawi, or in neighbouring countries. The 2008/9 spike, during which maize prices had risen some 180% above early 2007 levels prior to the 2009 harvest, had come after four years of multi-faceted efforts with considerable international support to strengthen food security. These efforts included the whole range of interventions to facilitate the internalising of risks and transfer of risks by agriculturists, provide social protection and increase small farmer productivity in growing their own food. And yet the spike was far from fully anticipated or subsequently amenable to a convincing explanation. For example Dorward and Chirwa (2010) suggest a complex and somewhat different set of influences behind the rising prices during 2008-2009 to those driving the 2001/2 food crisis:

- higher disposable income amongst consumers;
- increasing food storage losses;
- higher welfare and incomes amongst farmers leading to higher retention of food;
- a tighter, thinner market; and
- over-estimation of production. Were, as in the seasons prior to 2001/2, reported agricultural development successes somewhat exaggerated?

Added to this explanation some suggest:

- restrictions introduced by government in August 2008 on large scale private trade may have inhibited imports; and

<sup>54</sup> The movements in 'real' international prices may seriously underestimate difficulties implied by domestic price movements and also seasonality. The high proportion of basic food in consumption and the majority of rural households being food deficit small farmers makes them extremely vulnerable to seasonal price spikes: they sell to meet other non-food consumption, debt obligations at harvest and later are dependent on wage labour and social protection (Dorward, 2009)

- a too cautious approach to releasing food stocks to dampen price rises during the hunger season of January-March 2009.

There was a favourable harvest in 2009 and prices fell rapidly to below international and regional (South African) export price levels. There has been little evidence of sensitivity to more recent international price movements, illustrating the very limited degree to which Malawi is integrated into the global maize market.<sup>55</sup>

The explanations for the 2001/2 crisis and the extreme 2008/9 food price spike are then different and complex. There is uncertainty about the precise causal factors and their relative influence. In 2001 there was such extreme vulnerability that there were indications of a potential famine even before the planting of the maize crop had begun. That a higher level of effective demand contributed to the 2008/9 spike is consistent with evidence of much more localised food insecurity than in 2001/2 and 2004/5 (FEWSNET, 2010). In both 2001/2 and 2008/9 specific government interventions also contributed to a tighter market. There are doubts about over-estimation of production of maize and other staples prior to 2001/2 and again prior 2008/9 (Dorward and Chirwa, 2011; White *et al.*, 2010). This is an obstacle to effective immediate public action and, as discussed below, for providing a basis for risk transfer.

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<sup>55</sup> The recent trend in Malawi maize prices has been wholly contrary to those in international prices thus showing the limited degree to which Malawi is integrated into global maize markets. The Lilongwe retail price of Mkw32 /kg in December 2010 implies no change over one month, a drop of 27% over one year and 44% over 2 years. The US dollar price equivalent of c. \$210/tonne is some 12 % below the current US export price for yellow maize of around \$ 240 per tonne. The Lilongwe price is some 10% above the South African export price of c. S190/t. Allowing for trading margins that implies that Malawi domestic prices are substantially below South African export prices. The latter are also substantial below earlier prices, about 14% below 2009 and 25% below 2008 prices. In contrast US export prices for maize were 37% and 43% above those 12 months and 24 months previous.



**Table 14: Incomplete knowledge: Disaster Likelihoods and Outcomes in Malawi: River Floods, Weather-related food crises and Global Food Price Spike Risks**

		Knowledge about outcomes	
		←-----	-----→
		Outcomes well characterized	Outcomes poorly characterized
Knowledge about likelihoods	Firm basis for probabilities	<b>Risk</b> Now: Extreme River Flood (stationary probabilities)	<b>Ambiguity</b> Complex weather-related food crisis (prior to 2001/2 near famine)
	No firm basis for probabilities	<b>Uncertainty</b> Future: Extreme river floods in era of environmental change (e.g. ENSO teleconnections in east and southern Africa) Now: Global Food Price Spike (GFPS) in 2010-12	<b>Ignorance</b> Future: Complex weather-related food crisis Probabilities for rainfall in era of rapid environmental change. Outcomes may be less extreme with higher levels of social protection incl. input subsidies Future: Joint Risk Of Global Food Price Spike And Natural Disaster

### Food Insecurity and Disaster risks: a Layered Approach

The framework of disaster risk reduction for Malawi is even more problematic than that for Bangladesh. This is illustrated in Table C1 in the form of a Stirling matrix of incomplete knowledge for extreme river flooding and what are characterised as complex weather related food crises. In retrospect Malawi can be seen to have slid invidiously during the 1990s into a condition of extreme vulnerability with chronic and systemic food insecurity, as well as high exposure to communicable diseases closely associated with widespread poverty. Malawi then experienced a sequence of weather-related food crises from 2001 -2006, each associated with extreme price volatility.<sup>56</sup>

These crises are commonly described as 'droughts', but they were not 'extreme' events from a hydro-meteorological perspective, as had been the droughts of 1948/9 and 1991/2 (Table 14). There is a parallel between this continuing crisis and the state of extreme chronic food insecurity in post-conflict Bangladesh from 1972-80, when a sequence of hazard shocks of varying severity occurring almost every other year triggered food crises and actual famine in 1974. These episodes are therefore characterised as *complex weather related crises* that would be considered because of the extreme impacts to be disasters according to the ISDR

<sup>56</sup> The statistics record since 1987 indicate that epidemics are responsible for more deaths than floods and drought combined. Epidemics would therefore rank as a higher priority risk in terms of the current UN/ISDR definition of a disaster than Floods or Droughts, singly or combined. The most deadly epidemic disasters (other than that recorded for 1989) fall immediately before, during and after the prolonged period of weather related food crises from 2001 to 2005. (Hay and Phiri, 2008)

definition (Box 4). This empirically based characterisation of the disasters that have affected Malawi is, however, highly problematic for designing risk transfer instruments that focus only on a rainfall deficit.<sup>57</sup> Such uncertainties provide the rationale for adopting a layered approach to natural disaster risks (Table 15)

#### Box 4: What is a disaster?

The ISDR definition of a disaster recognises and provides a useful characterisation of the systemic weather-related food crises that have impacted so severely in Malawi during the decade since 2001.<sup>58</sup>

“Extreme” refers to two distinct areas: hydro-meteorological or seismic extreme *events*, and to extreme *impacts* on human and ecological systems. Although extreme impacts often follow an extreme event, either extreme can occur without the other. The human and ecological impacts of natural hazard events, whether extreme or not, are mediated by exposure and vulnerability. (Adapted from IPCC, 2011)

**Table 15: Malawi - Natural Disasters and Food Spike Risks**

Annual probability (layer of risk)	National (Systemic) Shock	Comments
High risk $P \geq 0.1$	a. Complex Weather Related Crisis: 1991/2, 1994/5, 2001/2; 2004-6, 2008/9	Implied Annual P (1991-2010) = 0.25
	b. Extreme River Floods: 1991, 1997, 2001, 2003, 2008	Draft NDMS (2010) listing: Implied Annual P (1991-2010) = 0.25 These events are NOT systemic disasters
Medium risk $0.02 < P < 0.1$	c. Extreme Drought: 1948/49, 1991/2	Implied annual P (1941-2010) = 0.03 Draft NDMS (2010) also lists 'meteorological droughts' in 1987, 1992 1994, 2004 and 2005.
	d. Coincident GFPS and Extreme National Disaster:	The implied annual probability is uncertain, but at least equal, assuming independence, to the joint probability of a GFPS (0.1) and the combination of flood or complex weather/drought risks: $P_d \geq 0.1(P_a + P_b) = 0.05$
Low risk $P \leq 0.02$	e. Catastrophic earthquake:	Risks are low, but possibly non-stationary – increasing with elapsed time since last extreme shock

**Source:** National Disaster Reduction Strategy (Malawi, 2010); Dorwood and Chirwa (2011).

<sup>57</sup> The widespread tendency to treat rainfall variability as a one tailed problem of drought and deficits during the growing season results in excessive rainfall being ignored or misinterpreted as 'drought' or even as 'flood' in the case of the 2001/2 shock (S. Carr in IDC, 2003; Clay et al., 2002)

<sup>58</sup> "Disasters are extreme impacts associated with a severe disruption of the normal, routine functioning of the affected society, but a disaster may also arise from a concatenation of physical, ecological and social responses to lesser physical events." (ISDR, 2009: italics added)

Since 2002 there have been substantial efforts in Malawi by government, civil society and international support to reduce food insecurity and limit price volatility, using the whole range of instruments considered in Section 4. The spike of 2008/9 is therefore 'puzzling' in the light of reported 'successes' in addressing food insecurity and promoting food production from 2005/6 onwards. The balance of factors is apparently different in 2008/9 from previous spikes, but the risk of another crisis must be considered to be very high, unless it could be demonstrated that people are less vulnerable – better able to cope with environmental variability – and that public actions are more effective in limiting impacts. On the evidence available there is a very high risk of another weather-related crisis (Table 15). This potential for food crisis is the focus of our review of risk frameworks (Section 4).

*Floods* are the most frequent and widely reported natural hazard in Malawi. The southern lakeshore districts are most vulnerable to flooding. They displace people and result in damage to fixed assets and crop losses. Flood may also be a contributing factor in a complex shock as in 2001/2. The connections between environmental degradation and flood patterns in the Lower Shire River is well recognised and warrants further investigation in the context of Rift Valley tectonics and also climate change – another area of uncertainty. However, these events are localised level, high covariate risks (Table 14). In an era of climate change the influence of ENSO teleconnection on rainfall in the catchment area is uncertain.

There are weak linkages between domestic and international markets and limited transmission from the latter. This implies that a global food price spike, although potentially a globally a high probability event - annualised probability around 0.1 (Table 3) - should not be regarded on the basis of historical experience as a high risk threat to national food security and anti-poverty focussed development in Malawi. Furthermore, it is questionable whether specific measures are required to address the costs imposed by international volatility. The possible exceptional circumstance is when there is already an anticipated highly likely threat of domestic crisis and so it might be provident to programme or take an option to ensure delivery at a predictable cost (see below). The probability of such a coincident event is assessed as a medium risk on the basis of historical experience (Table 15). However perceptions that shape policy are sensitive to recent experience and the near coincidence of a global food price spike in 2007/8 and the subsequent domestic maize price spike in 2008/9 has at the least increased awareness of international prices.

*Extreme droughts* are uncommon in Malawi.<sup>59</sup> And again it is unclear what additional measures might be appropriate beyond those required to limit or prevent a weather-related crisis. Perhaps there is scope for research to investigate the benefits and costs for example of stock and virtual stock possibilities in addressing the risk posed by such an event especially in the context of investigating the potential costs of adaptation to climate change.

*Catastrophic earthquake* is recognised as a disaster risk after seismic events recently recorded in the Rift Valley zone. (Malawi, 2010) However, this low but uncertain hazard risk which could raise issues of siting and design of infrastructure as well as regulation building is beyond the scope of this study.

This layered review of hazard risks and food price volatility suggests clear priorities. A national disaster risk reduction strategy should in the first instance be organised to minimise the risk of further complex weather related food crises. As such crises are typically associated with extreme food price volatility, there is presently no easily separable food price stabilisation agenda. Nevertheless to explore this conjecture we examine in Section 5.4 the range of interventions involved in parallel for a food crisis similar to those experienced since 2001 and a food price spike. The disaster risk reduction strategy should also be concerned with health insecurity and minimising the negative impacts on development and poverty reduction. This

<sup>59</sup> Malawi lies on the ill-defined shifting boundary between the more variable and so drought prone South East African climatic zone and the more humid, less drought prone East African zone (Private communication from M. Hulme). Regional scale climate modelling suggests that due to climate change the S.E. African zone may become more drought prone, but the implications for East Africa are less clear.

strategy will also encompass measures to minimise the potential impacts of extreme drought, which historically have been uncommon in Malawi.

Floods, which are locally a disaster almost every year, should be addressed through disaster risk reduction measures, including enabling the vulnerable to reduce their exposure, contingency planning and contingency funds, emergency assistance, recovery and social protection. Floods *per se* are not a source of systemic food security risk in Malawi and are not considered further in this chapter.

**Table 16: Malawi - Disaster Risk Management Framework for Complex weather related crisis and extreme drought for Rural Livelihood Protection and Food Security**

<b>Shock Appropriate response</b>	<b>Complex weather related crisis</b>	<b>Food price volatility</b>
<b>Category A: Facilitating decentralised action to reduce risks</b>	<i>EWS Information: Accurate, Timely, Transparent and Comprehensible Weather Forecasting</i>  <i>Measures to reduce transaction costs of financial flows (remittances)</i>	<i>Information: Accurate, Timely, Transparent and Comprehensible Data on prices, production, public and private stocks and envisaged market operations</i>  <i>Financial instruments to make the market more liquid.</i>
<b>Category B: Risk Transfer</b>	<i>Weather Insurance may be infeasible</i> <i>Refinancing micro-credit</i>	<i>Encourage forward contracting, futures, pull and call options</i>
<b>Category C: Limiting impacts on economic activity</b>	<i>Support for Agricultural stability: inputs and credit</i>  <i>Food market operations to limit domestic food price volatility</i>  <i>Trade measures e.g. removing tariffs and import restrictions</i>  <i>Longer term: infrastructural investments in hazard reduction incl. Flood protection, irrigation and support for self-protection</i>	<i>Support for Agricultural Production: inputs and credit</i>  <i>Food market operations to limit domestic food price volatility</i>  <i>Trade measures e.g. removing tariffs and import restrictions</i>  <i>Longer term: scale up public and private storage capacity and improving market management</i>
<b>Category D: Limiting impacts on poorer and affected households</b>	<i>Social Protection for poor and affected people</i> - including input subsidies, food transfers, cash transfers nutritional interventions and public works	<i>Social Protection for poor and affected people</i> - including input subsidies, food transfers, cash transfers, nutritional interventions and public works
<b>Category E: Macro-measures to sustain growth</b>	<i>Expansionary financing to sustain effective demand</i>	<i>Inflation alert; budgetary crisis alert</i>

### Risk frameworks: food crises, disasters and food price spikes

*Category A* interventions aim to facilitate normalisation of outcomes and enable those potentially affected to retain risks (Table 16).

There is an established public agricultural marketing and information system. Efforts are being made to improve the availability of this information and other on commodity prices within Malawi to smaller scale producers and traders. Such initiatives are critical in addressing the problem of asymmetric information in markets that especially disadvantage the poorest producers and those located away from main marketing centres. Agricultural commodity exchanges can also reduce price instability through more rapid spatial and inter temporal adjustment of prices.

The Malawi Agricultural Commodity Exchange (MACE), established in 2004 with government support, seeks to provide information and a platform for the expansion of futures trading. MACE is part of a regional initiative which includes the Agricultural Commodity Exchange for Africa (ACE), also based in Malawi, the Kenyan Exchange (KACE), and the centre the South African Futures Exchange (SAFEX, that is an internationally recognised market. MACE has launched an SMS and radio-based information service and also a telephone-radio platform for bringing together small individual trades. The volume of transactions is still small, with total sales of \$254,000 reported in 2008.

Most recently a private SMS market information system platform was introduced in December 2010. Subscribers paying KW150 per month have access to prices for six commodities. The initiative is implemented by ESOKO, a West African based info tech company under a USAID contract with US based CARANA Corporation.

A warehouse receipt system such as trialled in Zambia and which could deepen the market has attracted MACE interest, but so far not been attempted.

Informal cross-border trade with northern Mozambique is significant and de facto an accepted market inter-linkage. For example FEWS and GIEWS reports openly refer to this trade.

The Meteorological Department provides advanced seasonal weather forecasts in collaboration with the Southern Africa Regional Climate Outlook Forum (SARCOF). It also makes available regular web-based updates on actual weather. This probabilistic information is now widely disseminated by radio and other media. Such information also feeds into the Ministry of Agriculture's early warning system operated in cooperation with FEWS and the wider regional FAO supported EWS. The seasonal subsidised input campaign (see below) also now takes forecasts into account.<sup>60</sup>

Both producers and traders are now potentially better informed about agricultural prospects than a decade ago. The more established information arrangements and recent initiatives are more likely to benefit larger scale commercial farms who able to interpret forecasts for themselves and the relatively better-off poor farmers, especially where there are user fees. The poorest frequently have little flexibility in the timing and scale of their sales. A test of the success of such initiatives is whether there is reduced spatial and temporal variation in market prices over time. Another issue is whether for example agriculture is responsive in input use or the take up of insurance to information.

*Category B Risk Transfer:* this is attractive both for broadening the options available to the private sector and potentially reducing the need for and costs of public action (Table 16). Malawi is one of the countries for risk transfer initiatives that are being been piloted with World Bank led international support. Historically there was a near complete absence of commercial market mediated risk transfer for the vast majority of small farmers, the 80% operating with between 0.5 and 2.5 ha of land.

Promotion of commodity exchanges is a way, already noted, of facilitating futures trading. There are however practical obstacles to the development of a formal futures market,

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<sup>60</sup> FEWS, Malawi Food Security Update September 2009.

especially for staple foods, where there is a substantial level of informal trade and also a well-established history of government intervening unpredictably to ban or restrict trade. Most recently government banned exports of maize in 2008 and then temporarily ended restrictions, again allowing private exports of maize from August 2009 after prices had fallen dramatically.

The World Bank and partners have supported pilot index-based weather or parametric insurance in Malawi. Crop input cost insurance was made available with credit for small scale groundnut and tobacco in 2005. These pilot schemes were abandoned after the initial trial because there were a variety of implementation problems. Institutional arrangements were ill-equipped for something so new. Clients have difficulty in understanding an insurance concept which is novel to them, especially where it does not relate directly to their own circumstances. There was informal selling outside of the linked marketing scheme (Hazell *et al.*, 2010). Are such schemes a leap too far from desk-based theorising to being a practically implementable scheme? Would poorer rural households be more able to participate in crop insurance if they were to be allowed to become familiar with risk transfer from the spread of insurance for idiosyncratic risks such as death and disability injury under micro-credit?

### Country-level risk transfers

The other approach to risk transfer being piloted is on a collective basis. Commodities price instability and food crises in particular have had unpredictable and severe impacts on the public finances because of interventions to limit price extremes, support agricultural recovery and additional pressures on social protection programmes. The government spent some \$200 million responding to the 2005 crisis (Benson and Mangani, 2008). Hedging is widely recognised as a way of ensuring imports and counteracting unexpected price increases, but is little practised by African and other low-income countries' governments and their parastatal marketing agencies.

The Malawi government with support from DFID, took out a call option for a specified quantity of maize in 2005 on SAFEX and was able to exercise this option successfully in order to offset a rise in spot import prices that had occurred in the intervening period (Slater and Dana, 2006).<sup>61</sup>

Building on that successful experience and results of earlier weather derivative pilots, the World Bank devised a weather risk management contract for the Malawi government to help limit the potential financial risks of drought. DFID paid the initial premium for the contract in 2008/9 intermediated by Swiss RE and renewed for 2009/10 and 2010/11.<sup>62</sup>

The contract is modeled on the Caribbean Catastrophe Risk Insurance Facility (CCRIF) national contracts for tropical storms and seismic events, and is structured as a call option on a rainfall index. This index, known as the Malawi Maize Index (MMI), uses a predictive model to link rainfall at 23 weather stations to maize production. The model has been found to track past production fluctuations fairly accurately, given the high correlation between rainfall variability and production outcomes. Under the contract, if *predicted* production were to fall by 10% per cent or more below the historical average, Malawi would receive a graduated payout up to a ceiling of US\$5 million. The resulting funds are to be used to purchase a call option in the South African Futures Exchange SAFEX, thus securing the price for subsequent maize imports up to a specified quantity similar to the 2005 contract.

This pilot contract displays certain features of critical concern about the market-based approach using a parametric indicator;

- Sustainability of an instrument based on World Bank (IFI) intermediation and donor funding to subsidise the contract with the commercial market.

<sup>61</sup> Futures markets offer a call (for purchases) or put (for sales) option that is more appropriate for the exports case. A call option gives the buyer the right, but not the obligation, to buy the underlying asset (usually a futures contract) at a strike price specified in the option contract.

<sup>62</sup> This account of the weather risk contract is based on the account in Ellis and White (2010) supplemented by World Bank, 2009; Syroka & Nucifora, 2010.



- Institutional arrangement -the premium and TC as a component of an Agricultural Development Programme Support Project.
- It does not pay out to the farmers who may have individually incurred substantial losses from drought, but to the 'country' in the form of a financial capability to cover future maize imports.
- Reliance on an apparently consistent past relationship between rainfall data and production statistics that have in the past modified ex-post. The actual relationship may be compromised by recent official estimates maize production levels in Malawi that seem seriously at odds with observable price trends in the domestic maize market.

This contract is an experiment in public financial risk transfer: the practicality and ultimate usefulness of such an instrument for Malawi itself have to be considered in the context of other public actions to limit the interacting impacts of agricultural production variability and price instability. There is wider interest within the international development community in this as a pilot project. However, its sustainability depends critically on whether there is sufficient interest in the reinsurance market in such a risk transfer instrument.

*Category C* interventions seek to limit impacts on economic and income generating activity. Government has intervened actively with multiple food security objectives to reduce price volatility, assure food availability for all vulnerable consumers, and in promoting agricultural productivity and national self-sufficiency. The elements in this food security policy include stocks and sales from public supply, which also resources food-based social protection.

Historically government sought to achieve these objectives through regulation of trade, setting prices for publicly supplied food, backed by grain reserves and publicly managed imports (including food aid) and occasionally exports. Unfortunately, the process of liberalisation since the late 1990s provides an example of "the things that can go wrong with public food stocks when politics and economics combine in unfortunate ways" (Ellis 2010).<sup>63</sup>

### **Market operations and stocks**

In 1999, a decision was made to separate stock holding for food security purposes from the purchase and sale operations of ADMARC, the parastatal agency responsible for conducting public interventions in food markets. A new organisation, the National Food Reserve Agency (NFRA), was created for this purpose.

These roles were poorly managed during the food crisis period from 2001/2 up to 2005/6. External interventions, for example the IMF pressures to reduce stocks in 2001 and over-programming of food aid by donors with other imports in 2002/3 contributed to procyclical stock-holding operations. This experience then led to a separation in NFRA stock functions between a purely emergency stock (the SGR to be used only for free humanitarian distributions) and a commercial stock (that could be drawn on by ADMARC for sales at a fixed consumer price). However, the coordination of public stock operations with underlying changes in maize availability has continued to fail, with Malawi experiencing two further extreme maize price instability episodes in 2005-06 and 2007-09.

In 2008 ADMARC acquired stocks after an apparently relatively poor harvest. But then failed to release these stocks in a timely way to limit the price spike in early 2009. It has continued to hold some 45,000 tonnes of maize into 2011 after market prices fell sharply with the 2009 harvest. After further price falls in 2010 to below its sale price ADMARC is unable to offload ageing stocks.

Public stockholding capacity, if fully functional is relatively large in relation to total production presently around 3.5 million tonnes and a thin domestic market.<sup>64</sup> If there were to be

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<sup>63</sup> This discussion draws heavily on Ellis (2010), Devereux, 2002 and FEWSNET Food Security Updates for Malawi

<sup>64</sup> Presently the NFRA has warehouses and silos with over 300,000 tonnes of capacity. ADMARC has also a total capacity of 270,000 tonnes plus smaller warehouses. New silos are being built to ensure a 400,000 tonne capacity.

sustained efforts to improve in operational practice, better integrated with early warning on production prospects and the household food security situation, then there is scope for market interventions reducing price volatility.

*Trade policy measures* are employed, often precipitately in a crisis context as a further instrument to ensure domestic availability and contain extreme price movements. Thus in 2007 exports to Zimbabwe were authorised. Then as prices rose large scale private trade (buying and selling) was banned from August 2008. There is some question as to whether this action was destabilising. In 2011, in a market now overhanging with public stocks, private exports are to be allowed temporarily through the NFRA. Meanwhile informal trade appears to be only inconvenienced by such action, with maize flowing into deficit southern districts in early 2011 from Northern Mozambique.

Perhaps intervention is unavoidable, not least to resource food-based social protection programmes (see below) and because government has to act in a crisis situation. In this case more predictable and transparent interventions are needed for these actions to be stabilising. Intervention could be better employed to dampen volatility on both a seasonal and inter-year basis. In view of the cross-border market connections, it is difficult to envisage a market intervention and stock-holding policy that can be successful in isolation from wider regional action.

*Agricultural input subsidies* are a major component of food security policy aimed at both limiting effects of weather variability on productivity and assuring household food security. *Input subsidisation* is widely regarded as having been successful in reducing household food insecurity and shorter term productivity growth. The policy has however created severe problems of budgetary sustainability as total programme costs rose fivefold between 2005/6 and 2008/9 prior to the Presidential Election.

Input distribution in the form of starter-packs was used to 'kick-start' small farmer production after 1988/9. These targeted distributions were again used as a recovery measure in response to the 2001/2 crisis, but then declined with loss of donor funding support.

The implementation of a larger scale Agricultural Input Subsidy Programme (AISP) began again in 2005/6 in response to another crisis. There is a change of objectives to promoting equitable production growth and national self-sufficiency. From 2005/6 to 2008/9 the programme is estimated to have raised national maize production by 26 to 60 percent. In so doing, it is found to have contributed to wider economic growth and poverty reduction through increased food availability and higher real wages. The benefits of the programme relative to its costs have varied widely between years, depending on fertilizer and maize price levels, estimated yield responses to subsidised inputs, and the extent to which expenditure on input subsidies leads to greater use of inputs rather than displacement of commercial input purchases (Dorward and Chirwa, 2010). The displacement is estimated to be only 18% for smaller farmers and 20% overall (Gilbert *et al.*, 2011).

The scale of the income transfer has also risen to become an important plank in social protection representing the equivalent of 10% of annual household income for more than 40% of the population. The programme costs have however risen considerably to difficult to subsidise levels. The total cost in 2008/9, MKw 40 billion, were equivalent to 6.6% of the national budget.

"There is considerable scope for changes in programme implementation to raise effectiveness, efficiency and benefits in delivering growth, poverty reduction and food security, but there are also practical and political difficulties regarding the implementation of some of these changes and questions about their effects" (Dorward, Chirwa and Jayne, 2010).

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This capacity is able to ensure supply to social protection programmes. Domestic regional transport infrastructure is in contrast weak and by road vulnerable to adverse weather and flooding.

The high levels of subsidisation of targeted inputs play an important role in income stabilisation by cushioning small farmers against losses from weather and pest-related physical losses and the price collapse in thin markets. The subsidised distribution also allows those more in deficit to plant and apply fertilizer in the following season.

#### **Category D: Social Protection**

During the period since 2002 there has been a move towards a broader *social protection* perspective. Nevertheless, the primary focus continues to be on social safety nets in the short term, including the following components:

- Input subsidies;
- food transfers;
- cash transfers;
- nutritional interventions; and
- public works (Table 16).

This complex of social protection directed programmes provide continuing support, taking into account changing spatial and group incidence of vulnerability, the highly seasonal character of stresses and periodic more extreme crises.

*The production input subsidies* in contributing a substantial part of real incomes of food deficit households has already been discussed as a country-wide form of social protection.

*Food-based transfers* are primary, flexible food security interventions. The Malawi Vulnerability Assessment Committee (MVAC), following the practice established with the 2001/2 crisis, undertakes periodic assessment of food needs, which are the basis for spatially targeted free distributions. The *targeted free distribution programmes* are organised by government in cooperation with WFP and civil society organisations. This is a *continuing programme* that varies in scale of operation according to assessed needs. The programme addresses lack of entitlement or effective demand resulting from covariate hazard impacts, including floods and weather variability. This intervention is also a potential contributor to food price volatility in thin markets.

The periodic MVAC assessments recognise uncertainty about levels of need for assistance, not just because of difficult to predict hazards, but also because of market conditions. Thus the actual 2010/11 assessment in May 2010 estimated that 1.1 million people would require food assistance in the hungry period. The reassessment in November reduced this number by more than half to 500,000. This reduction is partly the consequence of 'lower than expected prices' (FEWS, 2010).

Food transfer operations are linked to the management of the NFRA, which has to plan with WFP and donors to ensure availability of food from domestic stocks, procurement and imports involving funding and delivery time lags. The considerable reduction in needs may explain the decision to allow 300,000 tonnes of exports in 2011.

*Cash-based transfers* are still an area of experimentation (Box 5). A challenging issue is determining the real value of transfers in face of extreme price volatility and in scaling up from a closely supervised NGO project also the budgetary implications.

### Box 5: Dowa emergency Cash transfer programme (DECT)

Following localised droughts in 2006 and 2007, Concern Worldwide implemented “emergency cash transfer” projects (the DECT programme) was one of these) that delivered cash to several thousand affected households for four months during the hungry season. The objective was to protect access to food by enabling cash recipients to purchase a basic WFP food ration (maize, beans and cooking oil) in local markets. Crucially, the payment level was adjusted every month: as local food prices rose in January and February, cash transfers increased, and as prices fell back when early harvesting started in March, cash transfers were reduced. This allowed households to purchase adequate food even when prices peaked. Cash recipients recorded better food security outcomes in terms of meals per day, dietary diversity and avoiding damaging coping strategies, compared with non-recipients (Devereux *et al.* 2006).

The public works programme is long established and a relatively successful complement to targeted income transfer programmes (Box 6).

### Box 6: Malawi’s public works programmes and seasonality

Short-term public works programmes (PWPs) are institutionalised with donor support as ‘counter-cyclical’ safety nets, in principle providing income transfers to poor households during times of seasonal need and preventing distress sales of assets, while at the same time creating infrastructure that can help reduce future risks. In practice, the capacity of PWPs to curb acute seasonally-induced vulnerability depends critically on the time of year at which employment is offered, the flexibility of work arrangements and the level and form of payment. Most projects have been implemented during the lean season, when need is greatest. However this is the time of year not only when projects are most difficult to operate because of the wet conditions, but also when household labour supply is under most pressure due to peak labour demands for own-farm activities and peak incidence of malaria, dysentery, undernutrition and other debilitating conditions. Participating households therefore bear significant opportunity costs in terms of their own production, correspondingly reducing the net value of the transfers they receive. The form of payment that best meets participants’ needs also varies by season. *Surveys of PWPs have found participants preferring food rations during the lean season when food is expensive, cash around harvest time when food is more plentiful and other expenses have to be met, and farm inputs at planting time.* While inputs-for-work have been piloted in Malawi, varying the form of payment according to season participant preference has yet to become commonplace, probably due to the management challenges involved. (Devereux and White, 2009)

The *Early Warning System* of the Ministry of Agriculture, which has received support from FEWS and the MVAC, and information inputs from civil society, in a more open society with improving information technology, underpins the social protection programmes. There is however still considerable uncertainty about crop prospects that are sensitive to short term variability in rainfall through the growing season. The considerable retrospective revisions to estimated maize production underscore the difficulties for fine tuning interventions to anticipated domestic food availability and food insecurity.

### Conclusions:                   towards a viable and effective combination of interventions

The questions surrounding over-estimation of production during 2006/7 to 2008/9 and the re-estimation of food assistance needs during 2010/11 provide recent examples of the difficulties in ensuring an effective combination of interventions. The scale of social protection interventions that has become normal since 2001 has enabled the provision of minimal levels of food security for most vulnerable people, some agricultural growth and progress on most of the MDG goals. This highly precautionary level of protection raises the issue of welfare dependency at household levels and in most at risk areas, for example in southern flood-prone districts. There is also the issue of financial sustainability encompassing input subsidisation,

potentially costly stockholding and food assistance with increasingly constrained food aid availability, except in response to a crisis. The attraction of risk transfer instruments to both government and external funders is understandable. These instruments may become established, but seem unlikely to replace more traditional policy instruments in the foreseeable future.

There is considerable scope for improving more traditional instruments for market stabilisation, social protection supporting production growth. Market information (Category A) is improving and there is apparently progress in early warning and needs assessment. Food market intervention, buffer stock management, as well as the use of trade policy, imports and exports, is weak and unpredictable. The better integration of market management with social protection is difficult where the latter relies on the advance assurance of sourcing of total supply from local supply and imports. Heavy input subsidisation is more predictable, but the outcomes much less so. The use of multiple instruments is a serious precautionary approach to recognising uncertainty and the food price weakness of each instrument.

Table 6 suggests that practically there are only issues of degree and balance between measures necessary to address a complex crisis and those required to address the extreme price volatility that affects Malawi. The policy issue could be reversed – the challenge is how to better incorporate extreme crisis risk into the management of price volatility under conditions of high food insecurity.

As the 2008/9 spike has demonstrated, price volatility is recognised to be a core issue in food insecurity and agricultural risk management. International prices are however less of a threat for Malawi. Nevertheless, for a small economy with open borders improved ways of addressing domestic insecurity have a regional trade dimension.

**Table 17: Correlation matrix (using natural logs of prices; all prices converted to Kwacha/kg)**

	Lilongwe	S. Africa	US Gulf
Lilongwe	1		
S. Africa	0.40	1	
US Gulf	0.63	0.80	1

Figure 13: Lilongwe Retail Maize price from April 2004

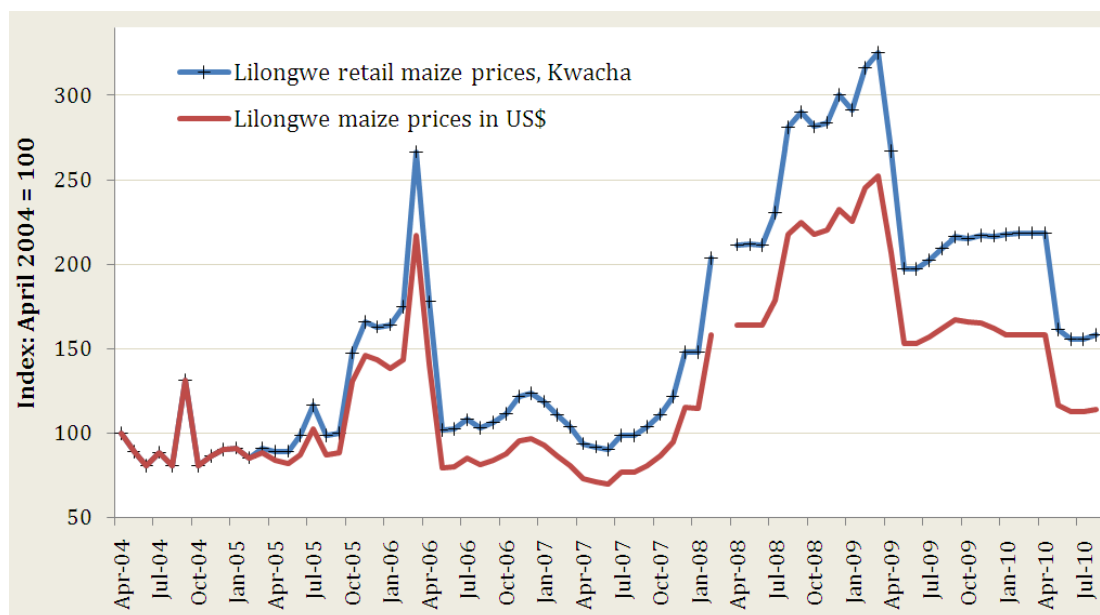


Figure 14: Monthly Malawi and International export prices in US dollars since 2004

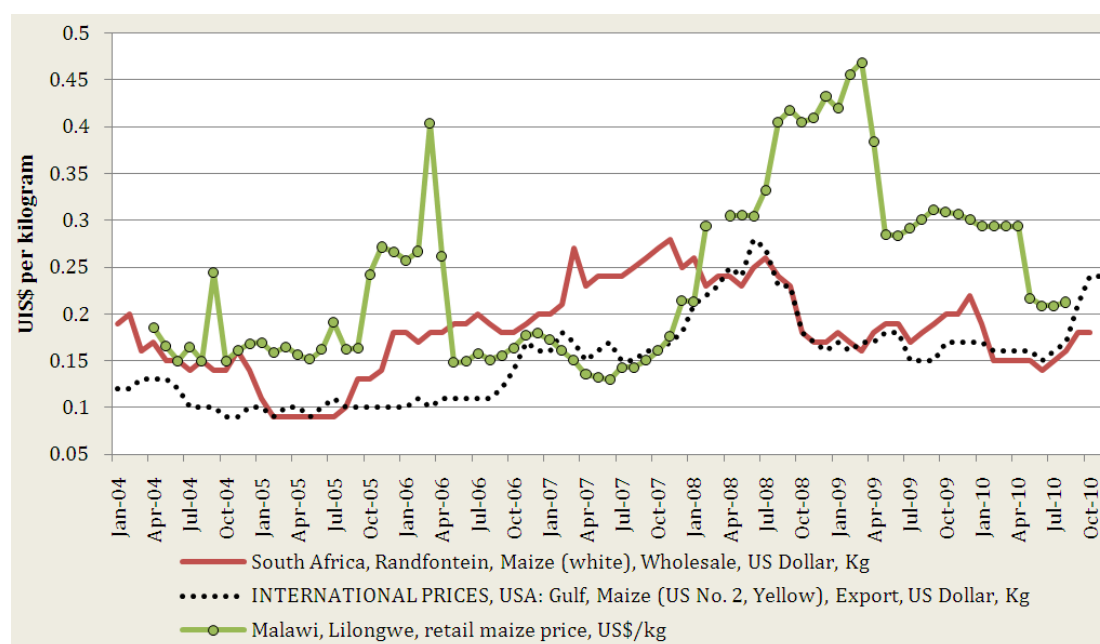
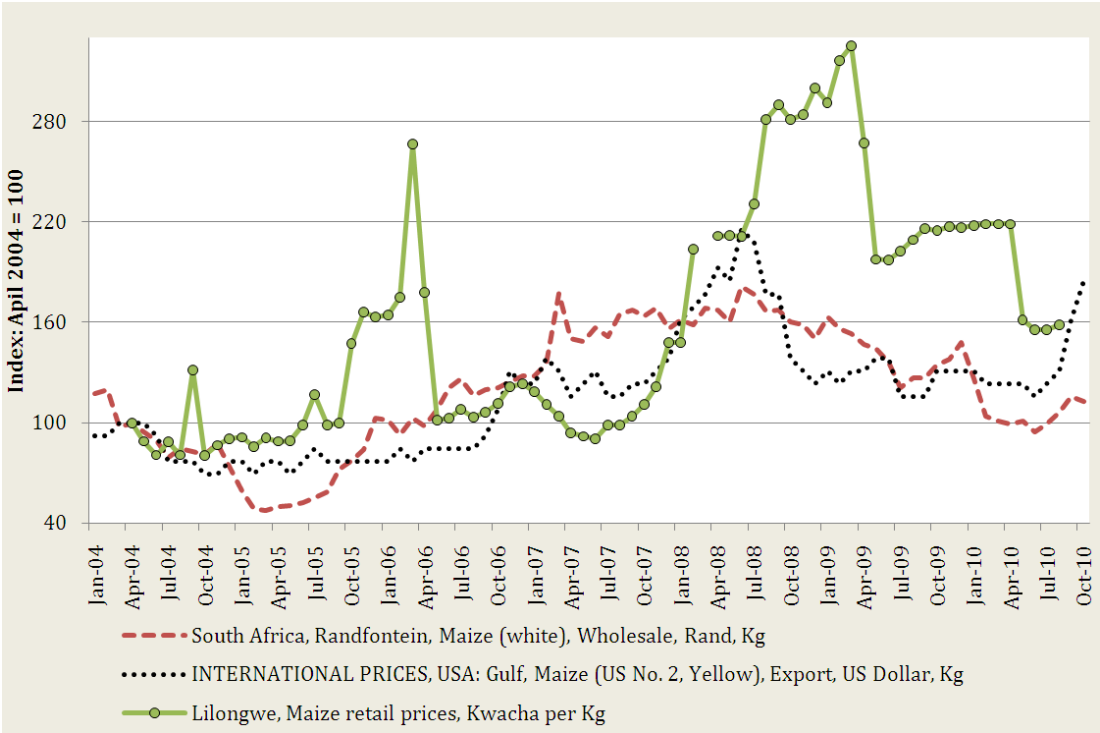


Figure 15: Monthly Malawi and International export prices: index of local prices





## Annex D: Price volatility and risk frameworks: Niger, Mali and Burkina Faso

### Background:

#### General characteristics

Burkina Faso, Mali and Niger are all fully land locked countries in the centre of the Sahel region. Rainfall is variable and unpredictable and droughts are a regular phenomenon. In the years 1970 and in 1984 the Sahel was stricken by some serious droughts affecting large parts of this zone. The most recent region wide drought was reported in 2004. In other years, rainfall has been more favourable although in almost each year pockets of drought exist.

Agriculture is largely comparable for the three countries. Traditionally the main crops are sorghum and millet that are cultivated by large numbers of peasants. The varieties used in the Sahel are drought resistant and meant for human consumption. The average yield is relatively low and the potential for raising it is limited. Research centres did find some higher yielding varieties, but these are not well adapted to farming practices and the cost benefit ratio is not convincing. Therefore, at a more or less given level of yield and without arable land constraints, the limiting factor becomes labour input and agricultural production is increasing with population growth.

The main modern cereals are maize and rice. Maize is often cultivated in rotation with cotton, the main cash crop. It benefits from the residual effect of the fertilisers, especially phosphates, used for cotton, as fertilisers for dry cereals are often not widely available. Rice production can be either rain fed or cultivated under irrigation.

### Food security and poverty

The three countries that are the subject of this case study all belong to the world's poorest countries ranking 160, 161 and 167 for Mali, Burkina Faso and Niger respectively out of the 169 countries figuring on the UNDP Human Development Index 2010. They are scoring slightly better on Gross National Income per capita but less on life expectancy at birth, education and health.

Poverty is widespread going from 46% of the population living below the poverty line in Burkina Faso<sup>65</sup> to 63% in Mali and Niger. Where poverty reigns, food insecurity is near. In Mali, people living in a situation of chronic food insecurity or extreme chronic food insecurity count for about 25% of the households<sup>66</sup>. In Niger this percentage is over 50% of its population<sup>67</sup>. The 2010 Global Hunger Index (GHI) published by IFPRI characterises the level of hunger for Mali as "serious" while those of Burkina Faso and Niger are "alarming"<sup>68</sup>. Out of these three countries, Niger is formally included in the list of "Countries requiring external assistance for food" by FAO<sup>69</sup> as of March 2011.

Low GNI and food insecurity are closely correlated to social indicators of health and nutrition. The GHI scores the countries based on three indicators: the proportion of people who are undernourished, the proportion of children under five who are underweight, and the child mortality rate. The three countries all score low on these indicators (see Table 18 below). They equally score low on education indicators.

<sup>65</sup> World Bank: *Burkina Faso at a glance*. February 2011

<sup>66</sup> Commissariat à la Sécurité Alimentaire: *Etude de Base de la Sécurité Alimentaire et de la Nutrition (EBSAN)*. Bamako, March 2009

<sup>67</sup> World Bank: *Food Security and Safety Nets*. Washington DC, 2009

<sup>68</sup> IFPRI: *2010 Global Hunger Index*. IFPRI, Washington DC, October 2010. The GHI scores the level of hunger on a scale of five being low, moderate, serious, alarming and extremely alarming.

<sup>69</sup> FAO GIEWS: *Country brief on Niger*. FAO, Rome, February 2011

**Table 18: Burkina Faso, Mali, and Niger: selected social indicators**

Indicator	Burkina Faso	Mali	Niger
Proportion of undernourished in the population (%)	9.0	10.0	28.0
Prevalence of underweight in children under five years (%)	37.4	27.9	32.9
Under-five mortality rate	16.9	19.4	16.7
Gross enrolment ratio in education (%)	32.8	46.9	27.2

Sources: IFPRI 2010 Global Hunger Index and UNDP 2010 International Human Development Indicators

### Cereal production

The larger part of the cereal production comes from own production. The majority of farmers are small farmers engaged in subsistence farming. They produce primarily for the need of their households. In good years they can produce small quantities in excess of their needs that are sold on the local markets. In bad years their production falls short of their needs and they become net buyers of food as far as their means permit so. Yields are generally low and development of agriculture is slow by lack of new technologies, money to buy the necessary input and education.

Since 1980 cereal production has steadily increased in the three countries. For the analysis we use the data series from FAOSTAT. Cereal production is converted into food grain equivalents by subtracting 10% waste for maize, millet and sorghum and 35% for transforming paddy into rice.

When looking at the figures we note an important difference in the developments in Burkina Faso and Mali at the one hand and Niger at the other hand. In the first two countries overall cereal production more than quadrupled in 2008 as compared to 1980. In Niger, however, production even did not triple.

In Burkina Faso and Mali agricultural production started to increase from the mid-1980s. In that period important reforms of the cereal markets took place in both countries. Public monopolies were abolished, cereal boards dismantled and the market became largely liberalised. In Niger this process only started much later, and so did take off of cereal production.

Looking more in the detail we note that production rise in Burkina Faso and Mali is triggered by the modern cereals maize and paddy. Especially in Mali growth is spectacular, maize production in 2008 being 15 times as high as in 1980 and paddy production 12 times. Burkina Faso is doing well with 10 and 4 times as high. In contrast, maize production in Niger did not increase while paddy production is fluctuating over the years between 1980 level and 2.5 times of it.

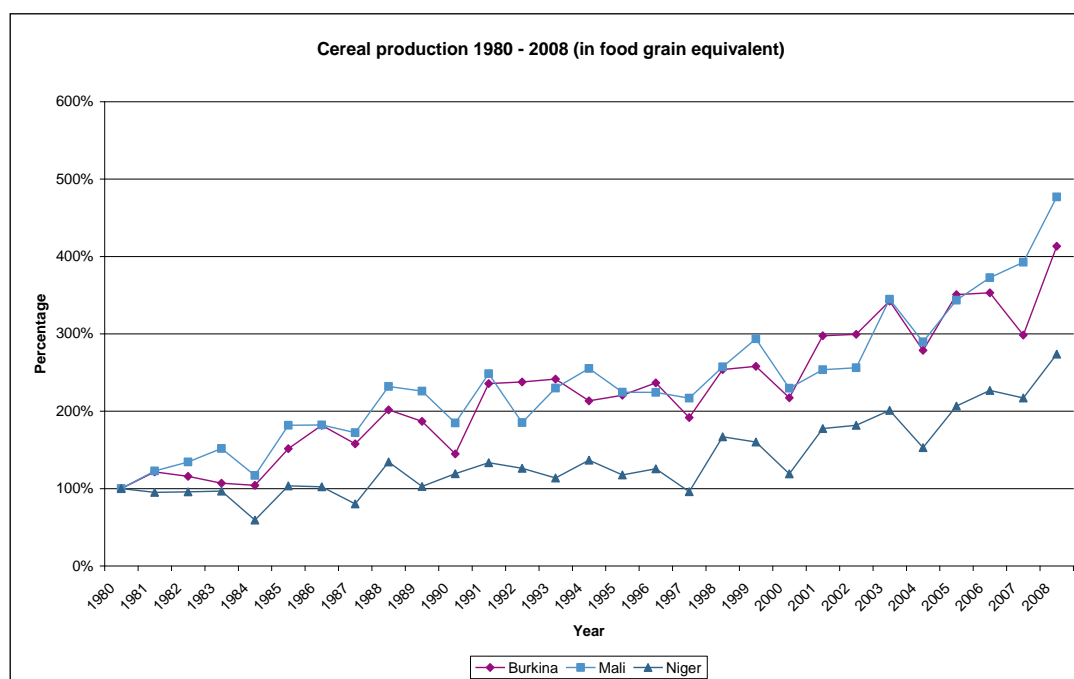
Production growth of traditional cereals millet and sorghum is much lower. In Burkina Faso and Mali production growth since 1980 is slightly higher than the growth of the population during the same period, while in Niger production growth does not match population growth.

The chart clearly indicates drops in production. The 2004/2005 crisis touched all three countries. It had two causes. First there was a general shortage in rainfall. But then, the crisis was aggravated by an outburst of locusts. While the first cause can be seen as an act of God, against which little can be done, the second plague can partly be attributed to failure of the system of early detecting and fighting these insects. For many years the fight against locusts was managed and controlled by the FAO. In the beginning of the years 2000, the responsibility was handed over to the national governments under the coordination of the Interstate

Committee of Fight against Droughts in the Sahel, CILSS. The coordination turned out to be cumbersome and the necessary commitments of the member states highly varying, leading to a crackdown of the, until then, relatively well functioning system.

A particular case is the drop in production in 2007 in Burkina Faso and less so in Niger while Mali doesn't seem to have been touched. In Burkina Faso maize, millet and paddy production significantly dropped, and millet in Niger, but sorghum seems not have been hit. This stresses the fact that some crises are supra national while others remain localised.

**Figure 16: Development of cereal production 1980-2008**



Source: FAOSTAT

## Spikes, crises and sources of vulnerability

### Producer price developments 2004-2008

Producer price statistics are equally collected by FAOSTAT. One can assume that substantial drops in production such as in 2004/2005 lead to food price spikes and that this increase is reflected in rising producer prices as well. Did this happen?

In practice, developments are much diversified and there are remarkable differences between the countries. In Mali, 2005 producer prices rose sharply in the aftermath of the production drop of the 2004/2005 cropping season. Prices of maize, millet and sorghum doubled as compared to the previous season, the only exemption being paddy prices. However, things are not always that worse as they appear. In fact, the 2003/2004 season resulted in bumper harvests and a subsequent drop in prices in comparison to 2003. After the 2005 production price spike, prices returned to levels as applied in 2003 and previous years. The 2008 international food price spike is not reflected in the FAO producer price statistics, which are made on a yearly base. It does not exclude momentary spikes during the year, but they did not result in a general price increase.

In Burkina Faso, price developments have been quite different. Producer prices hardly rose for millet and sorghum and only slightly for maize. Paddy is the exemption with producer prices

that more than doubled. In fact, the production jump that occurred in Mali in 2003/2004 had taken place in Burkina Faso a couple of years ago. As a consequence stocks might have been higher and the use of these stocks can have had a tempering effect on producer prices. The increase of the paddy is puzzling in this respect but an explanation might be found in structural changes in the production chain rather than in market circumstances. This should be further investigated. As in Mali, the 2008 international food price spike is not found back in the statistics.

Data for Niger are at odds with expectations. Producer prices in 2005 were only slightly higher than in previous years. The 2001/2002 drop in production is reflected in producer prices, but the 2004/2005 crisis not. Since the production in the years in between has been abundant, stocks might have been sufficient to maintain prices on the same level while the incoming food aid could have had a depressing effect on prices. Producer prices in 2008 did rise, but where all prices rose with exactly the same percentage, we assume that the data are rather based on an administrative decision than on empirical data from the field.

#### Consumer prices

The trend in consumer prices is more or less in line with expectations. The 2004/2005 food crisis is clearly reflected in the data series that we have for Mali and Niger (note: for Burkina Faso we do not have retail price data prior to 2006). Prices rise sharply, falling back the year afterwards to 2003 levels, rather than the exceptional 2004 ones.

The global food price spike of 2008 results in sharply rising prices in all three countries, although not reaching the 2005 price spike levels. However prices appear more volatile than ordinary rising and falling on an irregular base than following the normal seasonal trends and staying well above 2007 price levels during the years 2009 and 2010. In Mali and Burkina Faso price of imported rice sharply increases in the first half of 2008 and remains expensive during all 2009. Imported rice prices decline somewhat in 2010 but remain on a level well above that of 2007.

A FEWS NET evaluation mission gives several reasons for the high prices. The price spike was not only related to increase in food prices but to higher oil prices as well. These higher oil prices led to an increase of costs of inputs, especially fertiliser and to higher transport costs all over the product chain. Further, peasants appeared preferring to replace their partly depleted stocks and thus protect themselves to later shortage and price spikes instead of selling off their surplus production. This stock repletion was facilitated by the increase of production prices of other cash crops, such as sesame, peanuts and niébé. This diversification of income sources diminished the pressure on the peasant families to sell their scarce surpluses or stocks of cereals to meet their monetary needs.

Another factor is the growing integration of the agricultural markets. Traditional crops as sorghum and millet are predominantly consumed in the Sahel countries themselves. However, maize is very much cultivated and consumed in the northern parts of the coastal countries. The extension of the maize production in Mali and Burkina Faso links their cereal markets to these countries, while a raise of demand and prices of maize by substitution does feel its effects on the traditional cereals as well. Therefore, production fluctuations in the coastal countries influence on the prices in the Sahel countries as well.

#### Correlation with international price developments

The internal markets in the Sahel for millet and sorghum, which is not traded outside the region, show some sensitivity to global volatility (Figure 17). The anticipated realised harvests in 2008 were relatively good except for Burkina Faso. There has been a considerable growth in intra-regional trade facilitated by a common currency to the CFA Franc zone and also with coastal states, predominantly Nigeria, whose oil revenues can fund a massive structural deficit in food. Nigeria can influence strongly both import and export prospects for Niger.

As Abbott (2010) suggests the relationships with global markets are complex and often indirect through commodities that are partial substitutes in consumption and inter-linked

different local markets. This is confirmed by a comparison of maize and rice prices in Burkina Faso, Mali and Niger with major regional markets, respectively Nigeria for millet and sorghum and Senegal for rice, as well as with international prices.

**Table 19: Correlation matrix of Niamey and Kano maize and millet prices (logs of prices in CFA Franc)**

	Niamey millet	Niamey maize	Kano millet	Kano maize
Niamey millet	1			
Niamey maize	0.92	1		
Kano millet	0.70	0.81	1	
Kano maize	0.51	0.64	0.93	1

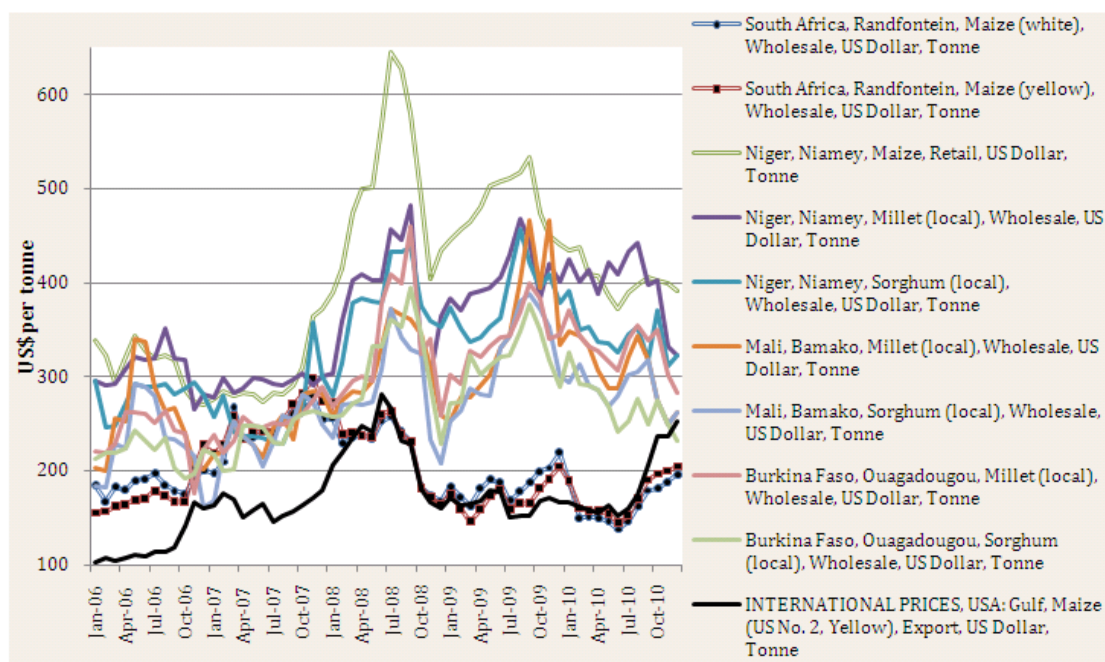
Traditionally the main cereals are millet and sorghum completed in the last decades by a growing production and consumption of maize, which partly substitutes the traditional cereals because of its taste and its ease of preparation. An additional advantage is the short growth cycle of maize, which makes the first production available in the middle of the lean season some two months before the other cereals.

The millet and sorghum varieties are not traded outside the Sahel region. The international trade in sorghum concerns varieties cultivated for animal fodder and not for human consumption. Subsequently no significant correlations can be found between the trend in millet and sorghum prices in the Sahel and the international Sorghum prices.

FAOSTAT Trade statistics indicate some linkages with the international market through import of maize, to Ivory Coast and subsequent transit to Burkina Faso and Niger. Quantities however are small and trade seems mainly of a regional character, Burkina Faso being a net exporter and Niger a net exporter.

Where maize can partly substitute the traditional cereals some price volatility of the traditional cereals might be expected as a result of international price volatility of maize. The available data do not confirm such a hypothesis. There is considerable volatility of coarse grain prices in the Sahel but apparently independent from price fluctuations in the world market, the internationally traded quantities being too small to effectively influence prices. The trend in locally traded wholesale maize prices in Mali matches with the trend for millet and sorghum, not with international prices. Therefore little argument can be found for transmission of international food grain spikes to regional markets in the Sahel for coarse grains. There are however some indications that the rise in average price level that can be observed could be linked to the increase of international oil prices with subsequent effects on prices of fertilisers and transport costs, which constitute an important part of wholesale prices. Credit restrictions by banks with upward trend of credit costs might be an explanatory factor as well.

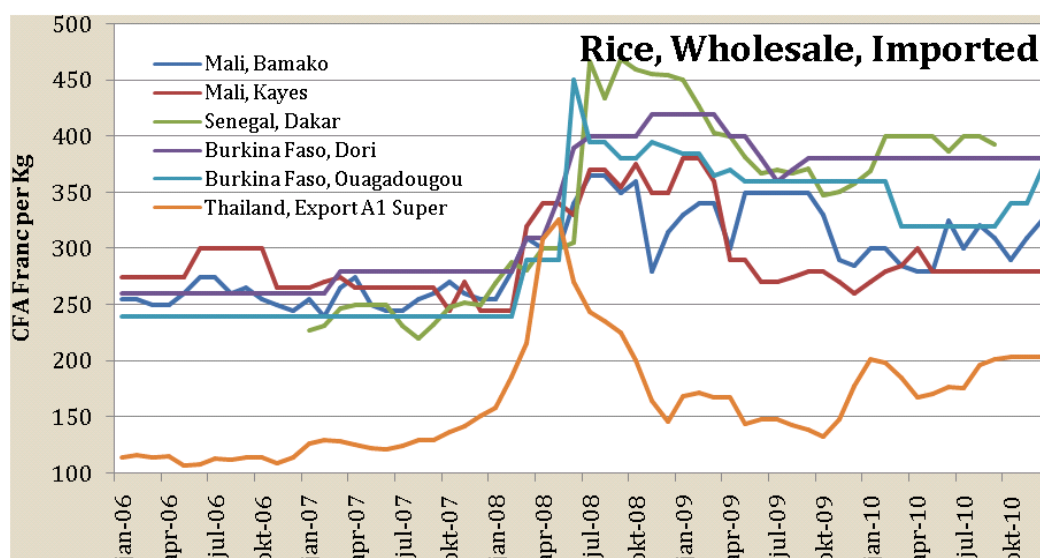
**Figure 17: Niger, Mali, and Burkina Faso coarse grain prices with South African and US maize prices in CFA Francs (2006-2010)**



**Source:** Constructed with data from FAO GIEWS

Rice is a regular consumed food grain for which the Sahel region is not self-sufficient. Being a frequently imported good, prices will be logically linked to world market prices. This is confirmed by the available data. At first sight, however, correlations appear not very strong. Taking into account a time lag of 3 month between the rise of international prices and the effective delivery of imports in the importing countries, the correlations appear clearer.

**Figure 18: Monthly rice prices: Mali, Senegal, Burkina Faso and Bangkok, 2006-2010**



**Source:** Constructed with data from FAO GIEWS and IMF for exchange rate



Interlinkages are quite strong. Correlations between Senegal and Burkina Faso at the one hand and Thailand at the other hand are stronger than between Mali and Thailand. This is in line with expectations given the higher self-sufficiency rate for rice of Mali compared to Burkina Faso and Senegal. Real time correlation between Western Africa and Thailand appear moderate but increase significantly when taking into account a time lag of 3 month between the price increase in Thailand and the effects in Western Arica.

**Table 20: Correlation coefficients of Wholesale and International Rice prices (CFA Fr)**

	Imported and wholesale rice					International	
	MALI		SENEGAL	BURKINA FASO		THAILAND	
	Bamako	Kayes	Dakar	Dori	Ouagadougou	Bangkok, A1 Super	A1 Super: 3 month lag
Bamako	1						
Kayes	0.58	1					
Dakar	0.77	0.63	1				
Dori	0.84	0.52	0.95	1			
Ouagadougou	0.87	0.57	0.88	0.96	1		
Thai A1 Super	0.62	0.48	0.45	0.66	0.64	1	
A1 Super 3month lag	0.74	0.64	0.79	0.81	0.80	n/a	1

**Source:** Price data from FAO GIEWS. **Note:** All correlations computed on logs of monthly prices from January 2006 to December 2010, except those involving Dakar, for which correlations were computed for the period from January 2007 to September 2010

The covariance between domestic markets in the case study countries, regional markets and international markets are illustrated in terms of correlation coefficients for capital city monthly prices during recent years (Table 20). There is a striking contrast. Bangladesh and neighbouring Indian prices are more closely correlated with global rice and wheat markets, although India has been more successful in limiting sensitivity of domestic markets to international volatility. The regional and international market linkages are more complex and commodity specific for Malawi as well as the Sahel countries. In West Africa intra-regional interconnections are more pronounced than those with international markets, especially with regard to traditional coarse grains and maize.



**Table 21: Basic cereals in four African case study countries: correlation coefficients for month prices as indicator of regional and international market linkages**

Commodity	Regional	International	Regional/International
Millet	Kano		
Bamako	0.47		
Niamey	0.61		
Ouagadougou	0.65		
Bamako/Niamey	(0.69)		
Maize	Kano	US Gulf	Kano/US
Niamey	0.64	0.29	-0.07
Maize	S.A		SA/US
Lilongwe	0.40	0.63	0.80
Rice	Dakar	Thai 90 days	Dakar/Thai 90 days
Bamako	0.77	0.62 0.74	0.45 0.79
Ouagadougou	0.88	0.64 0.80	
Bamako/Ouaga	(0.87)		

Source: Tables in Annex B, C and D

As in the cases of Bangladesh and Malawi an exploratory review suggests that annualised and multi-year drought risk is an area of highly incomplete knowledge. There are two conspicuous areas of uncertainty: probabilities of more extreme weather events under climate change: the likely incidence of single or multiyear droughts. Again as in Malawi up to 2001 changes in vulnerability in Niger were insidious and so the scale of the 2005 was not immediately appreciated.

#### Sources of vulnerability

Food prices in the Sahel follow an annual cycle with prices being lowest just after a new harvest and being highest some two months before the next harvests. The absolute level of the prices vary from year to year and is determined in the first place by the production with external causes contributing especially for internationally traded products. The agricultural production, in turn, is influenced by a large number of factors. This is shown in the Mali/UNDP National Development Report 2010 dealing with the food crisis in relationship to agriculture<sup>70</sup>.

The report distinguishes external and internal causes. External causes that influence the national prices thorough their effects on global prices of agricultural products are:

- lack of land and loss of land by urbanisation, desertification and erosion;
- meteorological changes and the warming of the earth;
- the energy crises, especially the oil prices and the subsequent effects on prices of transport and inputs;
- the world wide increasing human demand of food;
- the increasing use of cereals for fodder;

<sup>70</sup> Mali/UNDP: Crise alimentaire: enjeux et opportunités pour le développement du secteur agricole. Bamako, March 2010

- the use of cereals for bio-fuel;
- trade regulations;
- the global financial crisis.

On the internal side, the following causes are mentioned:

- natural causes like droughts and locust infestations;
- inadequate policies with regard to the management of natural resources and food security;
- landownership, urbanisation and population growth;
- management of the national production;
- market insufficiencies;
- state monopolies and tax regulations;
- management and availability of inputs;
- lack of access to credit;
- lack of respect of moral, religious and social codes such as inequitable distribution, appropriation and corruption;
- institutional problems.

Through this list of factors the multi-dimensional character of the way prices are set becomes clear. In the same way it is clear that international developments play a role but that internal factors are often preponderant.

### **Food Insecurity and Disaster risks: a Layered Approach**

The suggested layering of risk for Niger is strikingly simpler than that for Bangladesh and Malawi, and approximates more closely to the conventional framing of risks for semi-arid SSA countries, whilst drawing attention to uncertainty. So in this exploratory study we have omitted the formal step of setting out risks for the Sahelian countries in a Sterling matrix, and proceeded directly to present these risks in layered framework (Table 22). Systemic disaster risks are mainly linked to droughts, which often touch large parts of the Sahel region. Single year droughts are a frequent occurrence, equivalent to once every five years. Multi-year regional droughts occurred in 1972-4 and 1982-4. But subsequently rainfall patterns have been relatively more favourable<sup>71</sup>. The frequency of 'drought-related' systemic or national crises in the Sahel suggests an extremely high degree of vulnerability.

Estimates of drought occurrence for the region and at a more localised scale are highly problematic. There have been well-evidenced long-wave quasi cycles of relatively higher and lower annual rainfall, which are not well understood. This uncertainty is also associated with downscaling to regional level from global climatic modelling. Some models indicate that the effect of climate change could go either way in this region –more or less arid and more or less variable (as is likely to be indicated in the next IPCC report).

Although the Sahel is known for drought, extreme rainfall and flooding sometimes affect these countries. These events are seldom nationwide and mostly have been limited to certain areas or localities that are not presently assessed as systemic risks<sup>72</sup>.

### **Table 22: Niger: Natural Disasters and Food Spike Risks**

<sup>71</sup> Most droughts are region wide, but sometimes smaller scale droughts occur. Cereal production data indicate a drought in 1990/1991 that struck Mali and Burkina Faso but not Niger. Burkina Faso was affected by a drought in 2007 that hit Niger to a lesser extent but did not touch Mali.

<sup>72</sup> The damage, however, can be important for the affected populations and sometimes can have a wider impact. Flooding and excessive rainfall in parts of Mali in 2007/2008 had a negative effect on production.

Annual probability (layer of risk)	National (Systemic) Shock	Comments
High risk $P \geq 0.1$	a. Drought-related Single Year Crisis: 1997/8, 2000/1, 2004/5, 2009/10  b. Locust infestations: 2004/2005	Implied Annual P (1991-2010) = 0.2  Uncertainty because of climate change and the dynamics of vulnerability  Prevalence of shock related to locust infestations depends on the effectiveness with which the respective national governments cooperate and intervene
Medium risk $0.02 < P < 0.1$	c. Extreme Regional Multi-year Drought: 1972-74, 1982-4	Implied Annual P (1971-2010) = 0.05  Uncertainty because of climate change  and unexplained long wave quasi-cyclical annual rainfall
Low risk $P \leq 0.02$	d. Coincident GFPS and Extreme Regional Drought	The implied annual probability $P_d \geq 0.1(P_b) = 0.025$ is on the medium - low risk boundary and equal to the joint probability of a GFPS (0.1) and the regional drought risks, but uncertain because of climate change and as independence of events is in doubt

Agriculture in the Sahel also suffers from periodic locust 'plagues' or swarms, which can be a national hazard or wider. Unlike droughts, these swarms can be combated. However issues of management and governance may have increased the risk of a systemic event. A relatively effective system of locus control was put in place by the Sahel countries cooperating in CILSS and the Club du Sahel under the coordination of FAO. Since 2000 ownership has been handed over to the respective countries, which are supposed to coordinate through CILSS, with technical support from FAO. Budgeting and management became subject to national laws and procedures and political interference, and the system appears to have lost some of its effectiveness. There was a major locust plague in 2004 contributing to the 2004/2005 production shortfalls<sup>73</sup>.

### **Risk frameworks: food crises, disasters and food price spikes**

Price volatility in the Sahel is closely associated with climatic variability, with its impacts on crop production and animal husbandry, and so on the annual cycle of production and consumption in what continue to be largely rural economies and societies. There are country and context specific influences: weaknesses in governance have contributed to the severity of crises in Niger. There is some transmission of global commodity price volatility as shown in Section 3 and detailed in Annex D. Nevertheless because of the overwhelmingly close association between prices and the annual cycle of production and inter-annually the weather, it is difficult to isolate a systemic price volatility risk from that related to drought. So it is

<sup>73</sup> The outburst and its devastating effects are extensively reported in FAO/WFP (2004) reports, which do not elaborate on the causes of the plague. However, the political dimension of the failure to fight this threat becomes apparent from a World Bank (2009) report on food security and safety nets in Niger that does not mention this locust plague as contributing to the 2004/2005 production crisis.

difficult to distinguish policy instruments and interventions directed to enabling decentralised price risk absorption and risk transfer, or limiting price impacts on agriculture, incomes and food security from measures to address the problem usually characterised as ‘drought’. For that reason the review of policy instruments is organised in terms of weather related risks and complemented by a consideration of price related risks.

A discussion of policy has to begin by acknowledging that agriculture and rural societies in the Sahel are highly adapted to ‘drought’ and other natural hazards. However, extreme events can overwhelm coping strategies and these may impoverish and damage human life prospects. These systems are also coming under pressures from population growth and intensification strategies, as suggested by the recent crises in Niger.

Little can be done as yet to protect agriculture on a real time basis from drought. Weather forecasts do not accurately predict where, when and how intensely it will rain. So farmers, most of whom are self-provisioning peasants (paysans) and pastoralists, are engaged in traditional risk management strategies involving production, storage and trade, and are assisted or hampered by public interventions.

Up to the early 1980s governments tried to protect consumers broadly by fixing prices and state trading, but these policies turned out to be ineffective and fiscally unsustainable. All three countries liberalised their cereal markets that had been closely administered by the respective governments in fixed prices and monopolising formal trade. Mali and Burkina Faso gradually liberalised their cereal markets from the early 1980s and Niger in the 1990s. The intention was to foster growth.

The market liberalisation and subsequent agricultural policies aiming at diversification and intensification in order to increase production (see Category C) led to a substantial increase of production. All cereals in Burkina Faso and Mali show increasing yields, whereas yields in Niger for millet and sorghum do not show any significant upward trend, with production increases reflecting area extension. Therefore the cases of Mali and Burkina appear to show that agricultural policy matters. Niger, where there have been several political crises during the last decades, is the only country included in the list of countries requiring external assistance for food. A qualification in attributing too much to policy is that since the 1980s agriculture has also benefited from coincident, relatively favourable weather. In the case of the three Sahelian countries we have not attempted to construct a complete disaster risk management framework as we as analysts felt insufficient familiarity especially with for example the multiplicity of social protection instruments in these countries.

Category A measures to facilitate normalisation of outcomes and enable those potentially affected to retain risks.

*Market information systems:* Liberalisation potentially exposes the many small peasant producers to the mercy of a small class of traders. In order to improve market functioning and their position as sellers liberalisation has been typically accompanied by establishing and strengthening market information systems with donor community help. Most countries in the Sahel now have well-established systems that monitor and publish wholesale prices in the main markets on a regular basis. The more advanced systems using modern communication tools like SMS-messages, making use of the growing expansion of mobile telephone networks.

*Decentralised storage:* traditionally farmers and rural community groups engaged in storage to manage seasonality and natural hazard risk. At these same levels storage of cereals is promoted, with NGOs often active partners to reduce poverty related patterns of post-harvest sales and subsequent higher price purchases, and contribute to improved decentralised management of risks.

One approach is to do so in a collective way through village warehouses. Over time results have been mixed. Some warehouses projects turned out well but others encountered problems of financing and poor management. At present attempts are being made to overcome the financing problem through a system of warrants. Micro finance institutions provide credit by mortgaging the production and give support in management. This system is promising, but the

limiting factor often is lack of sufficient funding from the side of the micro credit institutions to extend the system. Linking commercial banks to the micro credit institutions could be an attractive option. The banks refund these institutions allowing them to expand their activities, while the institutions themselves remain responsible for the loan portfolio. Another constraint is a too limited capacity to effectively provide technical and financial advice to borrowers.

#### Category B: Risk transfer

*Weather related risks:* Formal private sector agricultural insurance for peasant farmers or even commercial scale producers is practically non-existent as in most low-income countries, and the reasons are well understood.

The literature on agricultural insurances distinguishes two main types being traditional insurances and index based insurances. The traditional insurance protects an individual producer or group of producers against a specific risk. This type of insurance is very expensive and regular insurance companies generally avoid it. There are examples of cooperatives offering these kinds of insurance. Especially established micro-credit institutions could provide an operational structure that organises against idiosyncratic and localised risks.

*Index based insurances* pay out based on a trigger, that is the occurrence of a certain predetermined event like a drought, pests or a price spike. This type of insurance is much cheaper than the traditional one. However, it needs reliable data on long series of years, which in developing countries are often insufficient. Another inconvenience is its collective character. The payout concerns all subscribers to the insurance once the event occurs whether they are affected or not. This type can be applied on micro, meso or macro level. In the last case the beneficiaries are national or sub-national governments. The case described for Malawi in chapter 5.4 of the main report is of this type.

Index based insurance is also the subject of pilot experimentation in Mali and Niger for commercially oriented maize and groundnut producers. Weather station coverage is thin on the ground and rainfall data has serious problems of quality that make for difficulty in use for rainfall related payouts. With great local variability in rainfall and lack of assurance about reliability, the problem of basis risk is formidable. Alternatively remote sensing techniques might provide improved rainfall monitoring. Such a system is presently designed and tested by EARS, a high-tech remote sensing company with Netherlands technical and funding support in partnership with PlaNet Guarantee<sup>74</sup>. A pilot project is being carried out in 2011 in four agricultural areas in the western part of Burkina Faso. A similar index was developed for Mali, but farmers there reported that excessive rainfall and flooding was another major source of crop loss. This is another example of the two tail problem ignored in most index pilot projects.

*Price related risks:* formal insurance against excessive price volatility is not available or being attempted. In general, farmers are encouraged to protect themselves through storage against seasonality in meeting their own consumption needs along with production risk. Price risk exposure can also be limited by storage of output after harvest when prices are lowest until prices rise, as discussed above.

*Forward contracting* is another possibility to reduce risk of price volatility, and is not new. A form of forward contracting has been practiced for a long time in the cotton sector, where farmers get seed and fertiliser against a guaranteed market for their raw cotton.

Forward contracting requires long standing relationships of trust. WFP country offices signed several forward contracts in 2010 with farmers' organisations in Burkina Faso and Mali under the Purchase for Progress (P4P) initiative. However, results seem to be mixed so far (see Box 2).

Traders are mainly general traders. Specialised traders are rare. As a consequence they do not invest in infrastructure needed for long term trading in cereals and are in search of short term profit and subsequently offer low prices. They are often itinerant merchants. Known by the

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<sup>74</sup>

Rosema et al.: FESA Micro-Insurance: methodology, validation, contract design. EARS, Delft, 2010

farmers, there is no real relationship based on mutual confidence. Forward contracting might be an attractive option. However, it needs accompanying measures in the form of information and training, scrupulous respect of terms and conditions of the contracts by all parties and the creation of an appropriate institutional context.

#### Category C: Limiting impacts on economic activity

Fluctuations in agricultural production have a huge impact on livelihoods and poverty, as well as on the wider economy. Annual macro-economic growth rates are heavily influenced by fluctuating agricultural production. Given the scale of the problems, the means for effective, short term interventions remain limited.

Mali and Burkina Faso have pursued an active agricultural policy to enhance production. These are essentially long term measures aiming at intensification and diversification to improve food security. They involve the provision of inputs, credits and effective agricultural services. Maize production in rotation with cotton was promoted, and irrigated areas for the production of rice were expanded. Water harvesting and erosion control were introduced into areas dedicated to traditional crops. The 2006-2015 National Food Security Programme of Mali gives extensive attention to the intensification and diversification of production systems and the marketing and processing of agricultural production.

Possibilities of market interventions to restrict price volatility are limited. The systems of marketing boards that were intended to regulate prices and quantities proved ineffective and were abolished. They were replaced by a liberalised market system with limited government interventions around the creation and maintenance of the national security stocks.

Western African markets are integrated in the Western African Economic and Monetary Union (UEMOA) and follow the community rules. This implies free trade for most of the products between the member countries. Import and export restrictions are therefore only allowed under strict conditions. Besides the official trade there is extensive formal and informal cross-border trade with neighbouring countries, especially Nigeria and Ghana. Through these channels world market price volatility is transmitted to the national economies. In general these fluctuations are tempered by the fact that traditional cereals, still the bulk of the food consumption in the Sahel, consist of locally produced varieties that are little traded globally. The main volatility comes from price spikes of rice and maize, and from the effects of substitution of these with local cereals. Price spikes through international fluctuations remain therefore generally limited, the main reason for spikes being production shortfall within the countries.

#### Category D: Limiting impacts on poorer and affected households

All countries in the Sahel have an early warning system. Most of these systems were set up in the 1980s in response to the multi-year drought. There is close cooperation between the country systems with coordination assured by CILSS, FAO and WFP and technical support by the Famine Early Warning Systems Network (FEWS NET) (See Annex E).

The different EWS have defined more or less homogenous zones of livelihood systems in terms of agro-ecology and the socio-economic characteristics of the population. The systems have progressively refined the criteria, allowing potentially better targeting of the really vulnerable. Starting as a tool to detect food shortages in an early stage, they keep track of food prices as well and often monitor a number of health indicators of vulnerable groups.

CILSS, FAO and WFP are closely coordinating the systems with the respective national authorities. Joint monitoring missions are made at regular intervals or at request if special problems emerge. This enables the concerned authorities to react quickly to urgent problems if they are so minded.

The responses of the Niger government to the 2010 food crisis, initially identified by the EWS in late 2009, illustrate current practice (Table 23). There has been a broadening of the range



of interventions beyond conventional food assistance in kind to protect lives and health, to give livelihood support and to limit and mitigate the effects of rising food prices.

**Table 23: Responses to the Niger food crisis in 2010**

<b>Emergency humanitarian interventions to protect health &amp; life:</b> infants and young children, pregnant and lactating women (PLW). This is crucial to ensure that young children are not irreversibly damaged by the crisis	<b>Livelihoods support</b> to raise incomes of vulnerable groups and classes. This is crucial to ensure that people do not slide into destitution & economic hardship	<b>Market interventions</b> to bring down down/stabilise/mitigate rises in food prices so that people can access the food in markets with what income they have
Supplementary feeding of infants	Subsidised sales of food	
Therapeutic feeding of infants	Free distributions of food	
Supplementary feeding of PLW	Food for work	Emergency imports
Health interventions to combat malaria, meningitis, cholera, etc.	Cash for work	Controlling markets
	Cash transfer	Proactive to keep borders open and allow trade flows
Water and sanitation measures	Subsidised sales of fodder	
	Fodder transfer	
	Assistance with de-stocking	
	Assistance with next year crop (seeds, fertiliser, credit)	

Source: Wiggins, Clay and Keats (2010)

#### Category E: Macro-economic measures to sustain growth

The Sahel countries have very limited possibilities for expansionary financing to sustain effective demand in face of the negative impacts of a weather related shock. As members of UEMOA their common currency is pegged to the Euro. UEMOA members have to strictly adhere to the directives of the joint central bank. However, inflation is also normally constrained, and in single digits. Price spikes as a result of internal inflationary pressures therefore hardly occur. But there is some price volatility resulting from global commodity prices and exchange rate fluctuations between the Euro and the US\$ in which currency most commodities traded by these countries are quoted.

Economic growth in general and agricultural growth in particular is important in helping reduce the causes of food insecurity. The Burkina Faso and Mali market liberalisations and subsequent agricultural policies to promote productivity have been associated with a substantial increase in production and thus lower the need for food aid. Niger liberalised the markets much later.

Another important way to promote growth is the improvement of an enabling business environment. The market information systems have much improved the information and communication of prices and quantities. However, market power still remains biased towards the traders. Commercial laws that enable the parties to enforce agreements are badly



developed and often ineffective. Farmers often have to sell their production to itinerant collectors. If they do not come there is no market structure where the farmer can sell his products, even at a low price. This incomplete market structure raises the risks for farmers and hampers their willingness to invest within the sector. Therefore, improving the business climate could help stimulate agricultural production.

### **Some tentative conclusions**

The usefulness of the three-stage approach – identifying uncertainties, a layered approach to risks and a fourfold categorisation of policy instruments - is broadly confirmed. The layering of risks again underscores the difficulties of envisaging that extremely vulnerable people will be able to absorb risks to any great extent, as confirmed by the Niger crisis in 2009/10. Similarly the scope for risk transfer when drought is a high, but uncertain risk would seem to be limited.

Global price volatility is not a critical issue for these countries, unless there were to be a coincident extreme regional drought and a global food price spike.

The strong association between weather variability (drought) and intra-regional price volatility makes it difficult to clearly differentiate price volatility as a focus of policy from the fundamental driver of agricultural and economic volatility, the weather.

The comparison of similar measures in comparable economies at different times (especially the grain market liberalisation in these three Western African countries) suggests that agricultural and agro-commercial policies do matter and influence the degree to which shocks are felt and the way the economy can cope with it. Thus, long term policies co-determine the possible answers and outcomes to sudden shocks.

## Annex E: FEWSNET monitoring price volatility

FEWSNET has not so far undertaken a systematic review of its monthly *Price Watch* and assessment of its impacts, and so this account, based on interviews and correspondence is necessarily qualitative and provisional.

The Famine Early Warning Systems Network (FEWSNET) is a food security information programme wholly funded on a bilateral basis by USAID. It originated, as the name implies, as a famine early warning system, one of several such initiatives spawned by the 1992-4 drought and food crises in Sub-Saharan Africa. FEWS largely engages in regular retrieval and management of secondary data, but is also involved in regular primary data collection in some countries. FEWSNET conducts studies to build the knowledge base used to interpret monitored data and information.

FEWS has a long established interest in food prices as an indicator of household food insecurity, but less so on the behaviour of markets per se. Markets and trade were only seen as the place where prices are determined, and so any specific market functions that were occasionally examined were only of interest as they *directly* affected vulnerable households. FEWSNET was part of the refocus away from national and sectoral security to household food insecurity in the 1980s and 1990s. USAID began to fund FEWS as its own early warning system, focusing on the need for food assistance. It lacked confidence in some of the official assessments of food needs being made by FAO, or joint FAO and WFP teams. The programme is organized through a 5-year nationally competitive TC tender. FEWS has entered into TC projects in many partner countries, e.g. that with the Ministry of Agriculture EWS in Malawi.

FEWS went further in the design for the 2005-2010 FEWSNET program, when a Markets and Trade (M&T) component was introduced.<sup>75</sup> The primary focus of FEWS monthly assessments continued to be on prices and their household impacts. Nonetheless, FEWS started to give an additional focus to the structure, conduct and performance of markets and trade, quite independent of their linkages with the vulnerable populations. This focus on markets was difficult for the partners and even of some food security-related (agricultural) economists working with FEWS, who essentially saw markets and trade as a force acting on vulnerable populations, and not a genuine household food security issue.

### The 2007-8 spike and beyond

The global food and fuel price crisis of 2007/08 was the critical event leading to a shift from the time spent on household pricing issues towards a greater allocation of time and resources to understanding the complex of market forces affecting trade, food availability, and prices. But FEWS still treats prices as the proxy indicator for these influences.

The important steps leading towards FEWS giving parallel attention to markets as well as household food security were as follows. In November 2007 FEWS's attention became centred on why Sahelian post-harvest prices were failing to fall, and not following the usual seasonal pattern in the Sahel. They lacked a clear understanding of any global context that was later seen to be contemporaneously at work. Concerns about the sky-rocketing prices led them to begin to collect and monitor a dense network of food prices from a range of centres on a regular basis.

A Rome meeting in February 2008 of agencies concerned with food security highlighted the difficulties of separating global and regional dimensions of the international and several coincident regional price hikes. And so in May 2008 FEWSNET moved to make market price information publicly available on a regular basis through a new weekly, then monthly publication, *Price Watch*.

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<sup>75</sup> FEWS NET Markets and Trade Strategy for 2005-2010, Updated January 2008 <http://www.fews.net/Pages/markettrade.aspx?loc=3&l=en> In the M&T section at [www.fews.net](http://www.fews.net), there are numerous and growing number of market and trade related products.

However, there was and still is considerable concern within the programme about the influence that regularly-collected and analysed price information and analysis of the causes of rising prices might have on market expectations and behaviour at a regional and country level. Reporting on poor harvests and rising prices could make the situation worse (drive prices even higher?). While unable to rule out the possibility, it was determined that making more rather than less information is better for vulnerable consumers.

### **Objectives and scope of price monitoring**

The monthly reports state that "*Price Watch* presents a summary of key trends in selected markets. Prices for all commodities and markets monitored are available in the *Price Watch Annex*." *Price Watch* aims to make available price information on basic foodstuffs in terms of price levels and movements, in a consistent format every month to *professionals* working on food security and related humanitarian assistance and other food assistance. The coverage reflects FEWSNET's presence and priorities, and so is focused on food insecure areas and countries, especially in SSA.

The *Price Watch* report was initially conceived as a factual compilation of current price information for key urban food markets in countries where FEWSNET has an office presence, and other countries where FEWS can arrange a flow of current information. In practice this means most countries that are a priority for USAID food security and humanitarian concern are covered. Information is being made available as a public good, as an aid to better policy analysis and decision-making in a practical operational context.

The *Price Watch* report is a brief 2-page synopsis of the most noteworthy price trends. The *Price Watch Annex* provides all available "official monthly prices" in national currency and \$US per kg for the preceding month (e.g. for June 2010 in the 31<sup>st</sup> July edition) and 1, 12 and 24 month changes in national currency terms as in percent and as colour coded indicator arrows (blue - stable or limited movement: -4% - +4%; green fall of 5% or more; and red (alert - 5% or more increase).

### **Price anomalies as an indicator of food insecurity**

The underlying concept of *Price Watch* is that "anomalies in price behaviours are the core flag or initial indication of a potentially important feature of a change in food security." Recently, *Price Watch* has presented a brief region-by-region structured analysis of "Observations, analysis and outlook", drawing attention to what the FEWS analysts regard as '*anomalies*' and to short term developments or trends <sup>76</sup>.

The case mentioned above of the failure of post-harvest prices in the Sahel region to fall in 2007 after a relatively good harvest would be a clear example of an anomaly. However without established models e.g. of seasonality and spatial relationships between markets, it is difficult to identify the importance of or give precise meaning to an anomaly.<sup>77</sup> The interpretation of events is regarded as the function of the monthly FEWSNET country reporting, where an entire context of national and regional food security is used to explain the anomalies.

*Audience:* *Price Watch* has a well-based subscription list of several hundred subscribers. For a variety of reasons (e.g. decision-takers are too busy to access the web-site), the programme coordinator has maintained a monthly direct email delivery to some three hundred, mostly food security professionals. There is also a posted freely accessible web version of the monthly report on the FEWSNET web-site.

<sup>76</sup> Definition of an anomaly: "deviation from the common rule, or, something different, abnormal, peculiar or not easily classified" (Webster's Collegiate Dictionary, 10<sup>th</sup> Ed).

<sup>77</sup> The concept of anomalies is most explicit in relation to the recently launched FEWS NET geographic expansion of its monitoring (called Remote Monitoring):

"FEWSNET will not open offices in remote monitoring countries. Instead, working through partners in each country, FEWS NET will build a strong knowledge base in livelihoods, markets and trade, and climatology, develop an analytical framework, and identify key food security indicators. These indicators will then be monitored regularly for anomalies that may lead to increased food insecurity by FEWSNET staff in nearby country offices, in collaboration with in-country food security partners."

*Sources of information:* *Price Watch* largely relies on official partner country information sources, which are primarily at a national level. FEWSNET also supplements these data with information from NGOs, WFP and whatever else may be available to its country offices<sup>78</sup>. The emphasis is on providing real time information on a predictable monthly basis, and so if information is unavailable they simply exclude these sites rather than delay release.

There was initially difficulty in some partner agencies because, unlike FAO, FEWS has no official mandate to gather or distribute market information from official partners. However there has been growing acceptance and recognition of the usefulness of the reports and so levels of cooperation have improved.

Internally FEWS analysts feel that they have become more aware through their monitoring of how different markets are affected by context-specific features of the marketing and trade system within which they are situated (e.g. whether national oil prices are denominated in US\$ or Euros, etc). This led to recognition of a need to understand more complex market relationships.

*Learning by doing:* The evolution of FEWSNET's food price monitoring reflects its experience in launching and feedback, at least within the organization. No formal user survey has yet been attempted. FEWS and also GIEWS recognize the need for more formalized and regular feedback as an input into improving information dissemination. When asked about the ways the *Price Watch* monitoring was evolving FEWS pointed to a number of developments.

The process of launching *Price Watch* was intensive, especially the demands of obtaining information for a regular timetable. The countries, centres and commodity markets have been gradually expanding as more information becomes available on a regular basis. Similarly the range of commodities covered has expanded considerably. This has required an invisible but substantial process of liaising with partners.

FEWSNET now provide global market indicators (e.g. a limited number of price series for key markets for widely traded commodities) so that national and regional audiences and analysts better understand what are the global trends that may affect their own internal commodity prices. Some at national level do not have access to commercial datasets, and there is a problem of the synchronisation of *Price Watch* with other sources of information such as FAO and WFP reports that give global and regional coverage.

### **Global prices and national prices: transmission and connectedness**

FEWSNET does not presently include analyses of price transmission from global markets or inter-country market integration, but reports in parallel on countries within regions and on global commodity market developments. Thus it is useful to consider in parallel markets in Niger and neighbouring northern Nigeria (see monthly bulletins for June/July 2010). A capacity to measure market integration is a key unfinished feature of understanding markets for food security purposes.

### **Feedback and sustainability**

Informal consultations suggest that FEWSNET's price monitoring reports and its country assessments are seen as useful briefings for busy professionals within humanitarian and food security agencies including civil society. It would be instructive to know more about sources and uses of information in developing countries, including civil society and the media, as well as official partners. For example how have these groups tracked prices during the emerging 2010 price spike?

FEWSNET has expanded its coverage and functions over more than twenty years. There are, however, issues of sustainability and continuity as a wholly USAID funded TC programme.

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<sup>78</sup> *Price Watch* states "FEWSNET gratefully acknowledges the national market information systems, Ministries of Agriculture, Regional Agricultural Intelligence Network, World Food Program, various projects, foundations, and other partners for their assistance in providing price data."

The management of the programme is put out to tender on a 5 yearly basis, and so its future, precise remit, including for example the country coverage and its support for national level monitoring, is not assured. Most other potential international funders would find it difficult politically to justify funding a US Government supported and supervised activity. FEWSNET can only complement, and through friendly competition encourage, international agencies in fulfilling their mandates.

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