

Famines and Economics

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I. Introduction

SOME DOUBTFUL STARTING points for the analysis of famine can easily get embedded in its definition. Common usage allows two distinct definitions. One is that famine entails an extreme and general scarcity of food while the other defines it as widespread, unusually life-threatening, hunger. This paper follows the latter definition; I will say that a geographic area experiences famine when unusually high mortality risk is associated with an unusually severe threat to the food consumption of at least some people in the area. This definition does not require that there be a contraction in the aggregate availability of food—or even in its aggregate consumption—for famine to have occurred. But life-threatening starvation is present (even though checks and balances may eventually come into play to forestall mass starvation). Nor does this definition require that the set of people who face death is the same as the set of people who experience the threat to their food consumption; some may die due to diseases that spread during famines.

By this definition, or something like it, the twentieth century has seen famines in most parts of the world. In Asia,

famine occurred in Bengal (then part of British India) in 1943–44, and again in 1974–75 (in what is now Bangladesh). China had a famine in 1959–61. In Africa, there have been famines in Ethiopia, Sudan, Mozambique, Nigeria, Niger, Angola, Zaire, Uganda, Somalia, and Liberia, and a number of these happened since 1980. The former Soviet Union had three famines this century. In western Europe, Holland had a famine in 1944–45. A great many people died in these famines, though we will probably never know with much accuracy how many.¹ And the lost lives went

¹ For example, estimates for the China famine range from 15 to 30 million people (this famine was clearly the worst this century). (The upper estimate is that of Basil Ashton et al. 1984; the lower one is based on official mortality rates; see Carl Riskin 1990). The variance of estimates is as great for the Soviet Union's famines; it is estimated that between 5 and 9 million people died during the 1921–22 famine, and 5–11 million died in the 1932–33 famine, and 2–5 million in the 1946–47 famine (William Dando 1981). (Dana Dalrymple, 1964, quotes an even wider range of mortality estimates for the 1932–33 famine, namely from 1–10 million.) The Ethiopian famine of 1984–85 was clearly the world's worst since the 1970s, with about 8 million people deemed to have been affected directly of whom 1 million are estimated to have died (Helmut Kloos and Bernt Lindtjørn 1993). But nobody seems to have much confidence in mortality estimates for this famine either. On the difficulties in estimating famine mortality see John Caldwell and Pat Caldwell (1992).

hand in hand with lasting miseries of material and other deprivations for those lucky enough to survive. Yet surely (it has been said before) famines have been more avoidable this century than ever before.

Famines continue to raise deep questions about the performance of economic and political institutions. Did those institutions help protect people from starvation, or did they make matters worse? Economists have sometimes tried to answer such questions and to influence public policies towards famines. For example, the writings of Adam Smith, Thomas Malthus, and John Stuart Mill were used to support a *laissez-faire* policy with respect to food markets during the many famines in the British Empire during the nineteenth century.²

From about 1980, a new literature on famines emerged, also premised on a view that the tools of economic analysis can throw light on why famines keep happening, and what can be done to prevent or relieve them. The new literature has revisited many of the classic nineteenth century debates about famines, such as the extent and nature of appropriate governmental interventions in markets. Substantial progress has been made in developing a richer conceptual framework for understanding famines. Progress has also been made in advancing empirical knowledge. Some of the arguments advanced in past debates have been rigorously formulated and tested for the first time, though many remain untested, either because of lack of data or lack of effort. The empirical study of famines has posed a number of challenges. Traditional types

of data and other forms of "fair-weather research" (as Caldwell, P. H. Reddy, and Caldwell 1986, p. 696, nicely put it) may be quite uninformative about these events. For example, sample surveys during famines are rare, and aggregate data can be quite unreliable at these times. Studies of famines have relied on a wider range of types of data than normally found in applied economics; for example, accounts from direct observers, such as found in local newspaper reports, have been an important source of data, when used carefully.

This article offers an overview of this new literature on famines, and what issues endure. In addition to looking at what economic analysis can teach us about famines, the article tries to say something about what economists can learn from famines, including from the large body of work on this topic by non-economists. It is argued that the new literature suggests that famines can help economists and policy makers understand the tragic extremes to which otherwise adequate political and economic institutions can be driven when exposed to certain shocks. To understand famines one must understand how normal institutions work under stresses they do not normally confront. The article first examines famines from a micro perspective, emphasizing the multiple determinants of starvation and the likely nonlinearities. This is the topic of Section II. The article then looks at how the various markets and institutions which coordinate individual choices performed during famines. Section III takes up these issues. It argues that famines arise from severe aperiodic market and institutional failures in economies under stress. Arrangements collapse which had previously worked adequately. Understanding why that can happen helps us understand famines, and to understand the functioning of

² See, for example, Cecil Woodham Smith (1962) on the famine in Ireland in 1846–47, and S. Ambirajan (1978), Salim Rashid (1980) and Jean Drèze (1990) on the numerous famines in British India during the nineteenth century.

those institutions. Governments are among the institutions that often fail during famines, though recent literature also reports some real successes in intervention. Section IV tries to draw out some lessons for policy. Conclusions can be found in Section V.

II. *Microfoundations*

Attempts to understand the causes of famines, and what to do about them, have traditionally focused on a rather small set of economy-wide parameters, notably aggregate food availability and the rate of population growth.³ The main distinguishing feature of the new economic literature on famines is its emphasis on understanding the circumstances of individuals in famine-vulnerable settings, and how those circumstances interact with economy-wide variables.

1. *The Entitlements Approach and its Critics*

Famine is often blamed on some aggregate exogenous shock. This simple causal model can be questioned from a number of points of view. A shock of some sort can always be identified; a famine does not seem to have ever happened by “spontaneous combustion.” The most common shocks are spells of unusually bad weather and wars. It is not always obvious that the “shock” should be considered exogenous to the population in which the famine occurs; for example, a war is the outcome of certain peoples’ choices for which famine can be a predictable or even delib-

erate outcome. But even similar exogenous shocks can produce quite dissimilar outcomes, depending on initial inequalities in physical and human assets, the way the economy works given those inequalities, and the policies pursued in response to the shock. Some people suffer badly, while others may even gain. Yes, a shock of some sort can invariably be identified at the start of the chain of events leading to a specific famine, but to properly understand—and prevent—the famine one must understand that chain of events.

A better approach is to work from the perspective of those who suffer. That is the enduring lesson from the first and most influential contribution in the new literature on famines, namely Sen’s (1981) book, *Poverty and Famines*. This book was very much an economic analysis of famines, though it succeeded in attracting the interest of both economists and non-economists. Many economists were introduced to an important but somewhat neglected set of economic issues, and it offered many non-economists an insightful new perspective on those issues.

The central concept in Sen’s approach is an individual’s “entitlement set,” defined as all the commodity bundles that can be obtained from all the resources at the individual’s command in a given society, subject to the laws of that society. Starvation is then seen to arise from an “entitlement failure,” meaning that an individual’s entitlement set no longer includes enough food to stay alive. The failure can take any one of a number of forms, reflecting the fact that “people establish command over food in many different ways” (Sen 1990, p. 34). The entitlement failure could be due to a loss of endowments, or to a change in one or more of the various ways—through production, trade, or transfers—in which endow-

³ This article will not address the demography of famines, except to note that the Malthusian view that famines act as a check on population growth has been discredited (Susan Watkins and Jane Menken 1985; Caldwell and Caldwell 1992; Robert Fogel 1992). For an overview of the debates on demographic causes and consequences of famine see Siddiq Osmani (1996).

ments are transformed into entitlements. If a sufficiently large number of individuals experience an entitlement failure then a famine occurs.

One possible starting point for a chain of events leading to entitlement failure is a crop failure, such as due to a drought or flood. It is certainly true that some famines have been associated with a sharp drop in domestic food output.⁴ However, Sen (1981) rejected this as a universal explanation. A number of empirical studies have confirmed his conclusion that famines have quite often happened without a decline in current aggregate food availability.⁵ In some cases (including some severe famines) there was a food-availability decline (FAD) but it was relatively modest—more like a 10 percent drop in current food output than anything one could reasonably call a “crop failure.”⁶ In still other cases there was a small FAD, but *after* the rise in mortality.⁷ The link from aggregate food availability to starvation involves numerous economic and political factors. FAD need

⁴ See, for example, Sen (1981) on the famine in the Sahel in 1972–74, Michelle McAlpin (1983) on the famines in Western India in the late nineteenth century, Peter Nolan (1993) on the Soviet famines in 1931–33, and the Chinese famine of 1959–61, and Justin Lin and Dennis Yang (1995) on the latter famine.

⁵ Among others, see Fogel (1992) on famines in Europe between 1500 and 1800, Ajit Ghose (1982) on the famines in nineteenth century India, Paul Greenough (1992) on the Great Bengal Famine, Mohiuddin Alamgir (1980) on the Bangladesh famine of 1974–75, and Christopher Locke and Fredoun Ahmadi-Esfahani (1993) on the famine in Sudan in the mid-1980s.

⁶ Examples include the Great Bengal Famine of 1943 in which food output was only 5 percent below its average of the preceding five years (Sen 1981, p. 58), and famines in Ethiopia and Sudan during 1983–84 in which food output was 11 percent and 13 percent (respectively) below its level in 1979–81 (Drèze 1990).

⁷ For example, the harvest after the worst months of the 1974–75 Bangladesh famine was about five percent lower than the pre-famine harvest, which was above average (based on James Boyce 1987).

not cause mass entitlement failure; indeed some severe crop failures in poor countries have not resulted in famines.⁸ And there are other possible starting points, including wars which disrupt the production or flow of food and other commodities within an economy, or a speculative crisis in food markets triggered by rumors of impending shortages.

Sen's approach to famines carried a message that economics has a lot to offer both in understanding famines and in preventing them. That message was not lost on many reviewers, who clearly saw the attraction of encompassing the numerous ad hoc “single-cause” explanations for famines within a coherent framework; see, for example, the reviews by Kenneth Arrow (1982), Frances Stewart (1982), Shlomo Reutlinger (1984), and Robert Solow (1991, reviewing Drèze and Sen 1989). But others were unconvinced. Indeed, an often vociferous debate was instigated by Sen's writings on famines.⁹ Some critics argued that Sen attaches too much importance to food, and too little to other factors such as disease. For example, drawing on field work in Dafur, Sudan, Alexander de Waal (1989) argues that it was not starvation but an unsafe health environment while migrating that caused death. Others argued that Sen undervalues the importance of aggregate food availability, and

⁸ For example, Drèze (1990) points out that, at the same time as the severe famines in Ethiopia and Sudan in 1983–84, far larger food output declines (around a 40 percent loss of output) had occurred in Cape Verde and Zimbabwe yet there was no famine in those countries—indeed, mortality declined. Also see Sen's (1981, ch. 8) discussion of the diverse outcomes in the Sahel in 1972–74, despite common shocks.

⁹ An excellent overview of this debate can be found in Osmani (1995). Also see Meghnad Desai's (1988) and Stephen Devereux's (1993b, ch. 6) discussions of the various critiques of the entitlements approach.

that in doing so he risks misinforming famine policy and thus worsening the situation (see, for example, Peter Bowbrick 1986; and Devereux 1988).¹⁰ And some critics have questioned whether *only* people facing current entitlement failure will go hungry, pointing to evidence that poor people with ample entitlements may prefer to go hungry at certain times rather than sell their assets.¹¹ While agreeing with the basic message, other critics have said there is nothing new in the "entitlements" approach, claiming instead that it is a long-standing explanation of famines dressed in new garb (T. N. Srinivasan 1983; Amrita Rangasami 1985; Edward Clay 1991).

In retrospect, I do not think one could reasonably say that all of this debate has been insightful or interesting. Some has been based on misunderstandings of Sen's approach. A common misunderstanding is the claim that Sen proposes entitlement failure as a non-nested *alternative* explanation to FAD; for example, Devereux (1988, 1993b) interprets FAD as a "supply side" explanation of famine, while Sen's is a "demand side" explanation. Such an interpretation is not well founded in Sen (1981) where he makes clear that the entitlements approach should be seen as an encompassing framework, within which food availability is only one parameter.

Some critics have seen the entitle-

ments approach as too "static," pointing to anthropological and other (anecdotal but credible) evidence that avoiding current hunger may not be the main motive for coping efforts (Jodha 1975; Corbett 1988; de Waal 1989). The entitlements approach can, however, be readily extended to accommodate inter-temporal choice by recognizing that people may choose a degree of hunger now in order to avoid starving in the future.¹² In an inter-temporal consumption model with borrowing constraints and random income fluctuations, a "stock-out" will eventually occur such that all remaining assets are consumed, at which point the household will clearly be highly vulnerable to a bad income draw (Angus Deaton 1989; Alderman 1996). The threat of a stock-out can explain the observation that some famine-vulnerable households initially forgo consumption rather than deplete assets. As will be argued at a number of points in this paper, there are ways in which richer dynamic models can help understand famines. But these models are perfectly consistent with the entitlements approach.

Some of the criticisms of the entitlements approach have also been tangential at best to the main point. For example, the fact that there were antecedents of the entitlements approach, particularly in the literature on famines in nineteenth century India, does not appear to be at issue (Sen 1990; Drèze 1990). The nineteenth century literature on famines in India was still, however, firmly anchored to the view that crop failure due to drought or flooding was the ultimate cause of famines, though recognizing that various factors intervened in determining the household-level impact, including ac-

¹⁰ Problems of measuring food availability, and conflicting estimates, have fueled some critics, though at least one appears to be driven by faith alone; Peter Cutler (1993, pp. 72-73) asserts that "Food availability decline is always an element of famine, . . . even if [it] is not measurable at national or regional level."

¹¹ While such behavior has often been noted (see Narpat Jodha 1975; and Jane Corbett 1988, among others), its interpretation as something deemed to be inconsistent with the entitlements approach appears to be due to de Waal (1989). Also see Devereux (1993a).

¹² This point was anticipated by Sen (1981, p. 50) and answers de Waal's (1989) and Devereux's (1993a) criticisms of Sen's approach.

cess to other employment opportunities (Osmani 1995). The term "entitlement" has also generated some confusion. The term carries a normative connotation, although the intended meaning in this context is entirely positive; Sen (1981, p. 2) was careful to point this out, and specifically to distinguish his usage of the word from the normative meaning found in, for example, Robert Nozick's (1974) "entitlement" theory of justice.

Some of the issues that have been raised in the debates over the entitlements approach are more substantive. One of these is the fact that what constitutes an "entitlement" is conditional on a specific legal system, as this defines property rights and (hence) personal endowments. If famines entail the collapse of law and order, it will be meaningless to search for an explanation in terms of legal entitlements. This problem too was recognized by Sen (1981, p. 49), as well as commentators since (Arjun Appadurai 1984; Charles Gore 1993). The extent to which it undermines the economic analysis of famines is an empirical question. Here one should be careful to distinguish a collapse of quasi-cooperative, "informal," arrangements for risk-sharing and assistance for the poor from a collapse of the legal apparatus which defines and enforces property rights. Endowments remain well defined in the former case, but not the latter; and while there is evidence (reviewed later) that the former often collapses during famines, it does not appear to be the case that the latter commonly does.¹³ Starvation and its avoidance are for the most part legal.

Another substantive issue is the role health plays. Sen's (1981, Appendix A)

¹³ Though there are clear exceptions, such as the famine in Somalia in the early 1990s.

characterization of entitlement failure as a cause of starvation assumes the existence of a consumption "floor," above which one lives, but below which one dies.¹⁴ Failure to reach some well defined food consumption level is clearly a rather simple view of what determines mortality during a famine. Food is not the only thing that matters. For example, it has often been observed that an important proximate cause of death in famines is exposure to disease associated with a poor health environment, especially among those who migrate during famines (Sen 1981, Appendix D; Kurt Jansson, Michael Harris, and Angela Penrose 1987; de Waal 1989; Tim Dyson 1991; John Seaman 1993; Helen Young and Susanne Jaspers 1995). There is clearly latent inter-personal variability and, hence, uncertainty about survival prospects.

Some critics of the entitlements approach have downplayed command over food as a factor in explaining famine mortality, arguing that the health environment is far more important (see, for example, de Waal 1989). These are not, however, independent causes. The health environment is determined in part by the same variables determining consumptions; for example, the exposure to disease of migrating people during a famine is not exogenous, but (it can be argued) an outcome of the same entitlement failures which led to migration in search of food. And while starvation is not often identified as the proxi-

¹⁴ For convenience, I shall treat this consumption floor as a well-defined quantity of a homogeneous good. More generally it will be a vector. See Sen (1981, Appendix A) for a general statement. Also see the recent models of competitive equilibrium which have included sufficient conditions for human survival in equilibrium (Jeffrey Coles and Peter Hammond 1995; McGregor 1996); these models have also assumed that there exists a well-defined lower bound on individual consumption which is necessary and sufficient for individual survival.

mate cause of death during famines, it does appear to have a strong potentiating effect on the incidence and severity of infectious diseases (Nevin Scrimshaw 1990; C. E. Taylor 1985; John Post 1990; D. L. Pelletier et al. 1995).¹⁵ It has also become clear that in understanding the synergies among undernutrition and susceptibility to infection one should consider more that the biological relationship (as might be identified in a controlled experiment in which one measures the infection rate as food is progressively withdrawn from a single person). Behavior can generate a strong synergy even if biology does not. One clearly wants a theory which allows for other factors influencing famine mortality, both directly and via their impact on the effect of changes in consumption. However, that need not mean that command over food is any less important than one would have otherwise thought.

What issues endure, more than 15 years after the publication of *Poverty and Famines*? We can surely agree that FAD has limited power to explain famines, which have happened with and without FAD. We can agree that the proximate causes of famine have much more to do with entitlements and (hence) economics. But that still leaves many questions begging. Is starvation only a matter of entitlement failure? What determines vulnerability to famines? Can similar shocks yield very different outcomes? What causes the entitlement failure? Why is it covariate over

so many people? Do markets and (governmental and non-governmental) institutions help or hinder the way aggregate shocks impact on entitlements? This article will review what the new literature on famines (within and outside economics) has had to say about these questions. The rest of this section will look at theory and evidence on the link between entitlements and mortality; later sections will take up issues concerning the causes of mass entitlement failure, and the implications for policy.

2. Micro-level Determinants of Mortality

Borrowing from another Sen concept, starvation is fundamentally a *capability-failure*, rather than a lack of command over commodities per se.¹⁶ The ability to avoid starvation depends in part on current consumptions, but also on the health-relevant aspects of the individual's environment, and various idiosyncratic attributes of the individual which may depend on past health and consumptions. Building on work in related fields, including health economics and nutrition science, recent literature on famines has begun to investigate these links, though a number of issues remain poorly resolved.

There have been a few recent theoretical studies of aspects of economic behavior in settings in which survival prospects are endogenous (Mark Gersovitz 1983; Ravallion 1987; Gerhard Glomm and Michael Palumbo 1993; Ludovico Carraro 1996). Following standard practice in much micro-economic analysis of the determinants of health, one can postulate a "health production function" relating individual health attainments to individual con-

¹⁵ The same comment applies to some other causes of death during a famine. For example, suicide may be the immediate cause of death, but the hunger of that person or someone close to her is not far behind the scene; drawing on field work in Bangladesh during the 1979 drought, Bangladesh Rural Advancement Committee (1979, p. 11) writes that: "One woman in Rowmari became simply unable to stand the cries of her hungry children and, leaving them uncared, hanged herself."

¹⁶ On the meaning of "capabilities" and their relationship to other conceptualizations of well-being see Sen (1985).

sumptions, personal attributes (interpretable as "personal constitution"), and characteristics of the individual's immediate health environment.¹⁷ Assume also that there is a minimum level of health needed to survive. The probability that a person will survive in any period is then the probability that his or her personal constitution assures that health is above this floor, given consumptions and the health environment. The mapping from the consumption space to survival probabilities can be termed the "survival function." This is not a purely biological function, because it depends on behavior (including the impact of individual consumption choices on health), and the socio-economic environment (as it determines the health environment facing the individual).

If the health production function is quasi-concave in consumption and personal constitution, and the probability density function of personal constitution is unimodal, then it can be shown that beyond a critical value needed to assure at least a non-negligible chance of living, extra consumption will have a decreasing marginal impact on the probability of survival i.e., the survival chance will be concave from above in consumption (Ravallion 1987, ch. 2). There will still be a "live or die" point in consumption space, if only because a certain amount of food energy is essential to maintain bodily functions at rest. However, in discussing famine causation and relief policy the more relevant subset of the consumption space is where the marginal effect of a change in consumption on survival chance will tend to increase as consumption falls. This has a number of implications both

for understanding famines, and for policies to avoid or relieve famines. Before examining those implications, let us first look at the empirical evidence on the determinants of famine mortality.

There can be little hope of rigorously testing the relationships econometrically on suitable micro data collected under famine conditions. However, two sources of data still offer hope of throwing new light on these issues. The first is micro data for famine-vulnerable or similar settings under normal conditions. There is inequality even in poor economies; so there is scope for using cross-sectional variances and covariances at normal times to infer things about the determinants of mortality at abnormal times. There remains, however, the real concern that the underlying relationships may well be so sharply nonlinear that observations from normal times may be deceptive. I will return to this point.

Supportive evidence from micro data of a nonlinear relationship between mortality and consumptions that can be found in studies by nutritionists and others indicating that mortality risk rises sharply at low nutritional status as measured by anthropometric indicators (Lincoln Chen, A. K. M. Chowdhury, and S. L. Huffman 1980; Peter Heywood 1982; Seaman and John Rivers 1988; Partha Dasgupta 1993, ch. 14; Pelletier et al. 1995; Young and Jaspers 1995).

There have also been a number of microeconomic investigations of the determinants of nutritional status, though invariably based on data produced under non-famine conditions. An important strand of this micro-literature in development economics has aimed to quantify the effects of income changes on nutritional status. There has been a debate on the magnitude of the income effect on nutrition in poor

¹⁷ For an exposition of this approach see Jere Behrman and Anil Deolalikar (1988). For an example, see Mark Pitt, Rosenzweig, and Hassan (1990).

countries.¹⁸ In normal times, the average income elasticity of food energy intake may well be quite low even in poor rural settings; a number of studies have found elasticities around 0.05–0.1 (see the survey by Howarth Bouis and Lawrence Haddad 1992). However, this could easily rise to 0.2–0.4 among poor people. If one also factors in the nonlinearity between nutritional status and food-energy intake, one can find quite strong income effects on nutritional status among the very poor; elsewhere I have argued that the income elasticity of the incidence of severe under-nutrition in a poor economy is around unity, even though individual food-energy intake at the mean has a low income elasticity (Ravallion 1990a).

The reverse causation has also received attention. Here too a nonlinearity is plausible; conservation of energy in a steady state makes it impossible to support productive work unless consumption is sufficient to cover the body's food-energy needs at rest (Dasgupta 1993, ch. 14), but at higher levels of consumption further gains are unlikely to help raise productivity; this is the nutrition-productivity relationship built into the well-known "efficiency wage hypothesis."¹⁹ There is now supportive evidence from a number of micro studies that nutritional status can also affect consumption via its impacts on productivity (see the survey by Strauss and Thomas 1995). Again these

studies have been at normal times. But if anything one would expect the effects to be even stronger during famines. Later I will discuss possible implications for understanding famines.

Another lesson from micro data collected during non-famine times is that the welfare impacts of price and exogenous income changes can be highly diverse, even among poor people. Clearly behavior is geared in part to protecting living standards,²⁰ though some people will obviously be better able to do so than others. Households with chronically poor endowments, or whose endowments have been run down by a series of shocks, will be particularly vulnerable. Net trading position in food markets also varies among the poor. Peasants with enough land to be net producers of food will gain from higher food prices, but other peasants and landless laborers will probably lose, though even among the latter group, some will be protected by longer-term contracts. All this helps explain another empirical observation about famines: the victims often come disproportionately from certain strata of the poor, such as artisans and casual agricultural laborers (Alamgir 1980; Sen 1981; Desai 1989; Abdur Razzaque et al. 1990; Patricia Bidinger et al. 1991; Foster 1995).

The second source of relevant information is more aggregate, and possibly less reliable, data collected during famines. Evidence on the importance of prices and incomes to current consumptions during famines has come from di-

¹⁸ See Jere Behrman and B. Deolalikar (1987), Ravallion (1990a), John Strauss and Duncan Thomas (1995), Shankar Subramanian and Deaton (1996), and Aman Ullah and Nilanjana Roy (forthcoming). For a recent overview of this debate see Michael Lipton and Ravallion (1995, Section 4.4).

¹⁹ This has implications for (inter alia) the ways labor markets work in poor economies (James Mirrlees 1975; Joseph Stiglitz 1976; Christopher Bliss and Nicholas Stern 1978; Dasgupta and Debraj Ray 1986; Dasgupta 1993). Section III will discuss this topic further in the context of famines.

²⁰ There is a large literature on consumption smoothing and risk-sharing in developing economies; recent contributions include Deaton (1989, 1992), Mark Rosenzweig and Hans Binswanger (1993), Rosenzweig and Kenneth Wolpin (1993), Christina Paxson (1993), and Robert Townsend (1994). Also see Andrew Foster (1995) on the effects of borrowing constraints on child nutritional status.

verse sources. Both (anecdotal) qualitative and (more limited) quantitative studies of specific famines have identified a large increase in the price of food as an important proximate cause of food entitlement collapse. Discussions of famines in South Asia have emphasized the role of foodgrain prices (B. M. Bhatia 1967; Alamgir 1980; Sen 1981; Greenough 1982; Ravallion 1987; Sugata Bose 1990; Dyson 1991). Similarly, analyses of the recent famines in the pastoral economies of rural Africa (including Ethiopia, Sudan, and the countries of the Sahel) have identified the prices of food staples (particularly relative to livestock prices) as key variables influencing mortality (Sen 1981; Dirck Stryker 1993; Paul Ulrich 1993; Mahmud Khan 1994; Joachim von Braun, T. Teklu, and Patrick Webb 1994). And the price of food staples has been cited as one of the factors influencing the fluctuations in mortality observed in Europe during early modern times (Edward Wrigley and Roger Schofield 1981; P. R. Galloway 1985; John Walter and Schofield 1989; Post 1990).

While there has been no shortage of evidence confirming that entitlement failures have underlain specific famines, the evidence has been less informative about some important aspects of the precise ways in which entitlement changes impact on mortality. Key here is the nature and extent of the nonlinearities in this relationship.

The nonlinearity with regard to the price of food staples is an important issue for both understanding famine causation and for relief policy. The arguments and evidence reviewed above suggest that survival chances will be concave in consumption. Micro data on the characteristics of the poor in famine-vulnerable settings also suggests that vulnerable groups rely heavily on

current foodgrain markets.²¹ These conditions do not, however, imply that survival chance will be concave in food price, because food demand functions are likely to be convex in price. In discussing this question it is useful to work with the survival function defined on prices and incomes (by solving out quantities consumed), although for the purposes of the argument one need not assume that individual consumption choices are survival maximizing.

Small price increases may entail large increases in mortality among subgroups of the poor if survival chances are increasing and sufficiently concave functions of income (Ravallion 1987). And if these conditions hold then price variability over time will increase expected famine mortality. The critical value of the elasticity of slope will depend on properties of the food demand function; high price and income elasticities of demand, and low budget shares for the stored good, tend to raise the critical level of concavity needed to benefit from price stabilization. For example, if income is fixed and all of it is spent on food then survival chance will be concave in the price of food if and only if the elasticity of slope with respect to consumption exceeds two.²²

This is an empirical question. Econometric investigations of the relationship between mortality and foodgrain prices

²¹ For a survey of evidence on the poverty profile in low-income countries see Lipton and Ravallion (1995).

²² To see why, let $s(x)$ be the probability of surviving the current period when consuming an amount x of food. When all income is spent on food, $x = m/p$ where m is money income and p is the price of food. Because (by assumption) money income is unaffected by a change in the price of food, on differentiating twice with respect to p one finds that $s(x)$ is concave in p if and only if $-x \cdot s''(x)/s'(x) > 2$. For a more general formulation, relaxing some of these assumptions, see Ravallion (1987, ch. 2). Also see David Newbery and Stiglitz (1981) for a general discussion of the welfare effects of price stabilization.

over periods encompassing two severe famines in South Asia (South India in 1877 and Bangladesh 1974–75) indicate that high and unstable prices contributed substantially to the excess mortality; on regressing the death rate against a suitable nonlinear function of the price of the main food staple, mortality in both famines was found to be an increasing concave function of price (Ravallion 1987, ch. 2).

Arguably the single most important relative price determining the prospects of starvation in most famine-vulnerable economies is the foodgrain purchasing power of the wage rate for unskilled labor, which is more often than not the wage for casual agricultural labor. Figure 1 plots the number of deaths by month in one rural area during a period encompassing the Bangladesh famine of 1974–75 against the rice purchasing power of the agricultural wage rate in that area. Counts of deaths during a famine are notoriously unreliable, but the series used in this Figure is likely to be quite accurate.²³ There is a strong negative relationship, and an indication that the absolute marginal impact of higher real wages tends to fall as wages rise. The fitted line in Figure 1 is the regression of the log of the number of deaths against the log of the real wage rate; the regression coefficient (interpretable as an elasticity) is -0.55 which is significantly different from zero at

the one percent level (the standard error is 0.09).²⁴ Notice also that the strong overall relationship in Figure 1 is much weaker in normal, non-famine, times; on excluding the famine period, the regression coefficient drops to -0.29 , and is not significantly different from zero at the five percent level, though it is at ten percent level (the standard error is 0.16). A nonlinearity is again evident in mortality responses to shifts in entitlements.

Other variables mentioned in the famines literature as factors influencing mortality include the health environment and access to health care. Though plausible, there is little hard evidence on the impacts of these factors under famine conditions. Again micro data from poor economies during normal times has thrown some light on the impacts of these factors, though there are some serious concerns about endogeneity in regressing (say) child mortality on (inter alia) access to health care.²⁵ Aggregate cross-country data do suggest that differences in public health spending matter more to mortality among the poor than non-poor (Benu Bidani and Ravallion 1997). It can also be hypothesized that health-related variables enter non-additively in that sickness not only lowers survival chance at a given consumption level but may also add to the adverse marginal impact on mortality of a drop in food intake (as argued by Young and Jaspers 1995). Plausibly, some of these other variables will also have lagged impacts, and so mortality will be a dynamic variable which depends on past circumstances. So the long-run response of mortality

²³ The area is Matlab Thana, in which the International Centre for Diarrhoeal Disease Research Bangladesh (ICDDR) happened to be doing field research which allowed a careful monitoring of deaths during and after the famine. The beginning of the rise in deaths can be pinpointed clearly from the ICDDR data at around June 1974, and the death rate was not to return to its pre-famine level for a full two years. I have collated the ICDDR data with independent monthly data on wage rates for casual agricultural labor and coarse rice prices collected by the Bangladesh Bureau of Statistics for Comilla district (in which Matlab Thana is located).

²⁴ The R^2 is 0.60, and the Durbin-Watson statistic is 1.40. The regression comfortably passed LM tests for first-order serial correlation, functional form, normality, and heteroscedasticity.

²⁵ For further discussion and an attempt to resolve these problems see Mark Pitt, Rosenzweig, and Donna Gibbons (1995).

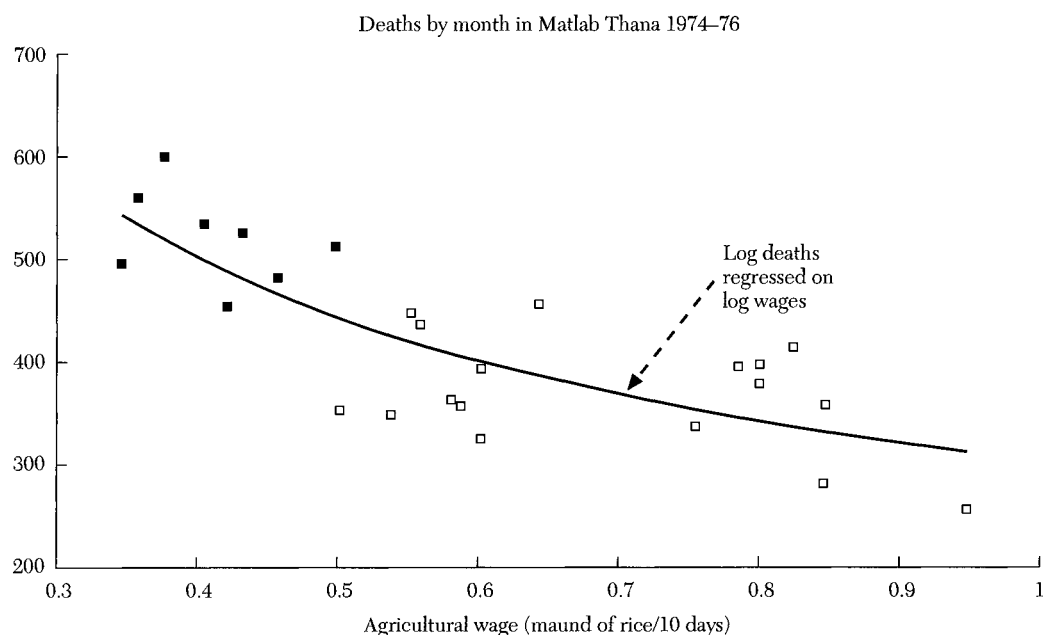


Figure 1. Mortality and Wages in a Rural Area of Bangladesh

Note: The solid squares are for the famine period (defined as Sept. 1974 to April 1975). The hollow squares are for before and after the famine.

among vulnerable groups to lower food consumption may be higher than the short-run response.

From the limited evidence available, it can be argued that either an increase in the price of food staples or an income loss will put upward pressure on mortality, but that these variables only have strong (or possibly even noticeable) effects when prices are initially high or incomes are low. A marked nonlinearity in the response is to be expected. It can also be argued that at initially lower incomes (higher food prices) there will be a higher mortality response from food price increases (income losses). Though some important clues have emerged from both micro data collected mainly under non-famine conditions and more aggregate data collected during famines, there is still much to do in testing and quantifying these relationships.

3. *Implications for Understanding Famines*

Nonlinearity in the relationship between mortality and consumption holds a number of implications for understanding famine causation. It implies that there will be long-term survival gains from stabilizing the consumption of a given person over time. Equalizing consumption over time will not in general be optimal because the marginal impact of consumption on survival chances will vary with other time varying factors such as the health environment. Conversely, sufficient destabilization of consumption over time will worsen or even produce a famine. Similarly, certain unequalizing redistributions of consumption will increase expected mortality. However (because the survival function may vary between people), an equal distribution of a fixed

supply of food need not necessarily minimize expected mortality. Nonetheless, inequality increasing transfers of sufficient size will clearly add to the death toll. Concavity of the survival function also implies that a small drop in food consumption for a large number of vulnerable people can entail a large increase in aggregate mortality. A sharp increase in mortality may thus be preceded by a steady (even slow) deterioration in the food consumption of vulnerable groups. This nonlinearity can be exacerbated by shifts in the survival function associated with a worsening health environment. Average food consumption of the poor in Bangladesh was on a downward trend for a decade or so prior to the 1974–75 famine (Ravallion 1995). Though the evidence is less conclusive, a similar process appears to have been at work prior to recent famines in Ethiopia, Sudan, and elsewhere in Sub-Saharan Africa (Jansson, Harris, and Penrose 1987; B. Gopalakrishna Kumar 1990; Webb, von Braun, and Yisehac Johannes 1992; von Braun, Teklu, and Webb 1994).²⁶

The lesson here for understanding famines is not to look *only* for a past history of decline (for that is clearly not a necessary condition), but rather to question the still widespread tendency to look for a sudden and sizeable shock to food entitlements as an essential primitive factor in famine causation. Such shocks are certainly common, but their impact may crucially depend on the recent consumption history of vulnerable groups. Nor does this mean that the onset of famine is easily predicted. The point at which a sharp escalation in

mortality will occur is still quite uncertain.

Concavity of the individual survival function only holds above some point. Survival for more than a brief period, or any form of activity, is possible only if nutrition is adequate for the body's functions at rest. Such "nonconvexities" might hold insights for understanding hunger and behavior with greatly contracted food entitlements. With sufficiently low aggregate command over food in some group (family, village, or relief camp) it will be optimal from the point of view of aggregate mortality to distribute food quite unequally. This may happen at normal times in very poor families (Lipton 1983). Nonconvexities suggest one possible explanation of the above average mortality rates observed in certain subgroups (children and the elderly) during famines; possibly these reflect corner solutions to the problem of minimizing aggregate mortality in a family or village. However, this is not much more than a conjecture because there has been little research into testing for such corner solutions. And there are other explanations, including non-cooperative behavior within the relevant groups, or the collapse of institutional arrangements for redistribution and insurance, because at low aggregate availability the pressure for the group to break up can also be strong.

The nonlinearity of mortality to food price changes that has been found for famines in which it has been possible to do the necessary tests also holds implications for famine causation and relief policy. Simulations using the econometric models of the effects of food price changes on mortality estimated for the aforementioned famines in South India and Bangladesh indicated that foodgrain price stabilization would have reduced famine mortality (Ravallion 1995).

²⁶ Also see Rangasami (1985) who emphasizes the importance of understanding the "impoverishment process" which leads up to the observed escalation in mortality, and Bruce Currey (1992) who questions the common view of famines as "discrete events."

lion 1987, ch. 2). This is so even if mean price had remained unchanged; more plausibly, aggregate demand functions for food staples are convex in price, so price stabilization at a fixed aggregate supply would also have entailed a lower mean price, with further reductions in mortality. (Section IV will return to the policy issues on how best to stabilize prices.) The concavity in price also suggests that the underlying survival function is concave in income; indeed, the income elasticity of the income derivative of the survival function must be presumed to be high, undoubtedly exceeding two. This suggests that famine mortality may be quite sensitive to changes in interpersonal inequality.

Possibly the most serious limitation of the above discussion is that it has been largely static. By this view, life-threatening entitlement failures arise from current events only. This limits our understanding of famines.

A simple model illustrates the potential insights from introducing richer dynamics. Following the standard assumption of the efficiency wage hypothesis, let current productivity depend on current food consumption in a nonlinear way, such that some positive consumption level is essential for any work effort, but that beyond some level of consumption the marginal gains from extra consumption start to fall. Suppose, however, that there is a lag in the consumption impact of a change in productivity, and (in particular) that current consumption is proportional to last period's productivity. Then we can write consumption C_t at date t as a nonlinear function $f(C_{t-1})$ of consumption at date $t-1$ as depicted in Figure 2 which illustrates a case with three steady-state equilibria (in which $C_t = C_{t-1}$), only two of which entail positive consumption of which only the higher one, at C^* , is stable. Suppose the initial equilibrium is at

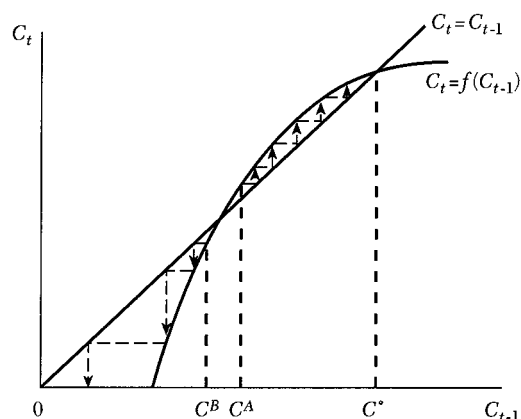


Figure 2. Similar Shocks, but Dissimilar Outcomes

C^* , but that there is a shock to current consumption driving it down to C^A . The dynamic adjustments will entail that consumption eventually returns to C^* . However, at only a slightly larger shock, enough to drive current consumption down to C^B , the outcome will be very different; the dynamics will then drive consumption down to zero. In one case there is a short-lived contraction, in the other there is a sustained fall in consumption.

The key assumption here is that there is a lag in the consumption impact of productivity changes. How might this arise? Carraro (1996) provides an interesting model in which the dynamics arises from the (plausible) assumption that current agricultural output depends on lagged labor inputs. When combined with the efficiency-wage hypothesis, and the nonlinear survival function of Ravallion (1987), Carraro shows how mortality rates can respond sharply to production shocks, with differentially larger impacts among landless workers.

The nonlinear dynamics can arise under even weaker assumptions. The usual static productivity-nutrition relationship can be interpreted as the steady state

solution of a dynamic of energy-conservation equation; the static relationship assumes that there is no change in the body's stock of stored energy (Dasgupta 1993, ch. 14). However, for the purposes at hand, one would not want to make that assumption; people starving in a famine will be running down their energy stores. Thus productivity, and hence consumption, in any period will depend in part on past consumption.

So nonlinear dynamics appear to be plausible in this setting. However, I know of no empirical work testing for multiple steady states in poor peoples' consumptions. Given that one or more of the equilibria will be unstable, the necessary data could well be hard to find. Arguably the multiple equilibria are always there, but a famine is one of the few real-world setting in which their potentially devastating consequences can be seen clearly.

III. Markets and Institutions

The last section pointed to ways in which even a seemingly small entitlement shock to poor people can induce large changes in their survival prospects, and also how similar shocks can have dissimilar outcomes. But what causes the changes in entitlements? Various markets and institutions determine the factors—the distribution of endowments, the structure of prices, and the pattern of transfers—which bear on the likelihood that an exogenous shock will turn into mass entitlement failure and hence famine. By and large these are the same markets and institutions which operate in normal times. Observers often point to their breakdown during famines. To understand famines we must understand the atypical performance of markets and institutions in poor countries.

1. Food Markets

Food markets are often blamed for causing or exacerbating famines.²⁷ Famines in market economies do not imply inefficiencies by the usual Pareto criterion; a reallocation that lets more people live may make others worse off. Entitlement failures leading to mass starvation are not inconsistent with efficient resource allocation in a suitably modified version of the Walrasian model of a competitive market economy (Coles and Hammond 1995).²⁸ Famines need not imply "market failure."

However, this observation will do rather little to subdue the concerns of the market's critics. Even if efficient, one can abhor the market allocation during famines because of its sheer inequity; as is well known, Pareto efficiency is consistent with a highly inequitable and (by any reasonable assessment) socially sub-optimal allocation. And concerns about the market's efficiency during a famine persist even if the seeds of market failure during famines were there *before* the famine. The markets that actually exist in famine-prone traditional agricultural economies are almost certainly incomplete markets, so there will normally be scope for Pareto-improvements.²⁹

One source of market failure is that markets generally do not exist to permit

²⁷ See, for example, Bhatia's (1963) description of "price famines" in India during the nineteenth century. Also see Greenough's (1982) study of the famine in Bengal 1943–44, and the discussion in Rashid (1980). Similarly, there were reports of hoarding by "grain barons" in Sudan in 1985 (J. Steele 1985).

²⁸ The standard model of competitive equilibrium assumes that everyone can survive without trade. Responding in part to conjectures in Desai (1989), Coles and Hammond (1995) show that Pareto optimality of competitive markets can coexist with some individuals dying in equilibrium because they do not attain some minimal consumption level.

²⁹ For a review of this topic, in a development context, see, for example, Stiglitz (1988).

trade in contracts for future grain delivery. Thus, current trading decisions are conditional on *expectations* about the prices which will prevail in future spot markets. And so expectations formation will matter for the allocation of consumption over time and hence mortality. Those facing starvation now will naturally have a high rate of discount. Yet even greater starvation in the aggregate may result without storage. In a market economy, this will depend on how well stock holders predict future scarcities. This is not a new observation, but (as with so much of the modern discussion of famines) had clear antecedents in the eighteenth and nineteenth century debates over famine relief policy.³⁰

In normal times we may tolerate a degree of market inequity or failure, because the cost of avoiding it exceeds the gain. The more interesting question in the present context is whether those same features of markets can magnify adverse external shocks. Anecdotes abound of "panic buying" of food in response to news of impending famine. For example, there were many stories of such behavior in newspapers during the lead up to the 1974–75 famine in Bangladesh (Ravallion 1987, ch. 3). Can such behavior turn the threat of famine into a reality?

Data have severely constrained efforts to address this question in famine-vulnerable settings. Bangladesh has been an important exception. Survey data on rice price expectations of wholesale traders and stock holders in Bangladesh rice markets shows little sign of informational efficiency (Ravallion 1987, ch. 6).

The restrictions implied by the unbiasedness of one-day-ahead price forecasts are convincingly rejected at the individual level, with a tendency to overestimate price changes indicated for all sampled traders. The random walk model of price forecasts for a terminal date is also rejected as a generalization of traders' forecasting behavior. Overall, the rational expectations hypothesis is a poor characterization of this market.

We do not have the benefit of surveyed expectations data during a famine nor even reliable data on important quantities, such as stocks. But we can study the effect on current prices of new information about future scarcities. Newspaper reports of flood damage to standing crops resulted in higher current price rises during the 1974–75 famine in Bangladesh, and this effect existed independently of future prices (Ravallion 1987, ch. 3). Price forecasting errors appear to have been positively correlated with readily available information on damage to the future harvest. Thus, rice hoarding prior to anticipated food-availability decline was excessive when compared to the likely outcome under competitive conditions with informationally efficient expectations. This appears to be the main reason why rice prices rose so dramatically in the lean months before the main (1974–75) winter harvest; rice prices more than doubled between March and October of 1974, leading to a devastating contraction in command over food among those with little endowment to fall back on. As is typical of the panic stage after a speculative mania, rice prices fell almost as sharply in markets during the week or two before the next harvest started to arrive in November. And in the end it turned out that the harvest was depleted by less than five percent over its previous level, which

³⁰ Adam Smith's (1961, p. 41) classic defense of the holding of food stocks during a famine explicitly assumed that stockholders would correctly predict future prices. For further discussion of the historical debates over famine relief policy see Rashid (1980).

had been unusually high; it is even questionable whether output fell below trend.³¹ Similar shocks to aggregate food availability in Bangladesh before and since that famine, had nothing like the same disastrous consequences.

The policies of the government and principal aid donors appear to have worsened matters. Rice prices in Bangladesh are influenced by the government's foodgrain stock, as determined by previous imports (including foreign aid) and internal procurement efforts. Thus, expectations of the effect of pre-harvest crop damage on future prices require an assumption about the response of the domestic government and foreign governments to shared information. The most plausible conclusion is that the stockholders' high price expectations during the 1974–75 famine were premised on a belief that the government would be unable to implement a suitable stabilizing response to the reported damage to the future crop. Donor threats to cut food aid on foreign policy grounds in early 1974 helped fuel that belief. It has also been argued that accelerated growth in the money supply helped fuel inflationary expectations (Bankim Chadha and Ranjit Teja 1992). The failings of foodgrain markets thus appear to have stemmed in part from (domestic and international) public-action failures.

Informational inefficiencies need not destabilize markets, and considerable instability is possible in an informationally efficient market. Quddus and Charles Becker (1994) show that the rice price formation process in Bangladesh is consistent with the possibility of

a speculative bubble even with rational expectations. However, it is clear that the way rice markets worked in Bangladesh meant that the combined effect of the crop damage from flooding and the external threats to food aid led to considerable de-stabilization of prices and consumption. In the end, there was clearly enough rice to avoid famine if only it had been better distributed for usage over time.

Concerns have also been raised about the *spatial* performance of markets in getting food from surplus to deficit areas. Dynamic analyses of spatial price differentials suggest significant impediments to market integration during famines; see Ravallion (1987, ch. 5) on the Bangladesh famine during 1974–75, and von Braun, Teklu, and Webb (1994, ch. 5) on the famines in Ethiopia and Sudan in the mid-1980s. The causes appear to include unusual transport costs and a variety of higher risks associated with the famine conditions (which most local transporters would have no opportunity to insure against); these stemmed in part from disruptions to trade due to the famine or its proximate causes, and were exacerbated by faulty policy responses, such as deliberately impeding the flow of food to protect better off regions.

2. Labor and Other Markets

Food markets have been the focus of much of the literature. Yet the markets for the things that poor people sell will be just as important to the outcomes. The capacity for work is the main asset of poor people. Naturally, when there is little inequality in access to land, the agricultural labor market tends to be thin. In Asia, and increasingly in Africa, there is sufficient land inequality for the labor market to be crucial to the impact of aggregate shocks on the rural poor. For example, the real agricultural

³¹ There are a number of problems in assessing agricultural output for Bangladesh; the statements made here are based on the careful work of Boyce (1987). However, they are also consistent with more commonly used sources, as used by Alamgir (1980) and Sen (1981, ch. 9).

wage rate in terms of the food staple fell dramatically during the 1974–75 famine in Bangladesh (Figure 1), and landless agricultural workers, part-time farmers and village artisans were the famine's main victims (Alamgir 1980; Sen 1981). There is evidence of a significant structural break in the short-run wage adjustment process in Bangladesh during the 1974–75 famine, without which the real wage rate in units of rice would have been almost twice as high during the worst months of the famine (Ravallion 1987, ch. 4). The famine appears to have been associated with a sizeable shock to rural labor markets, originating in the contraction in agricultural employment that came with the flooding.

A standard competitive model of the labor market would predict a lower real wage rate when an aggregate shock reduces demand for labor. However, such a model sits uncomfortably with other observations of seasonal underemployment in Bangladesh, as in other underdeveloped agrarian economies.³² One possible explanation for wage stickiness downwards is tacit collusion on the supply side within the village. This will be difficult to maintain during a famine in which the gains to defecting from such arrangements become high, and new workers appear on the local labor market who have migrated from flood affected areas. The sharp fall in the real wage rate during a famine may reflect a failure of an aspect of the village "moral economy" (discussed further below).

We do not know whether the wage fell enough during the famine to eliminate the famine unemployment. In all the academic literature and newspaper reports in Bangladesh on this famine, I have never read a claim that workers

during the famine no longer had trouble finding work, which one would have thought highly notable if true, given how much seasonal unemployment there appears to be in normal times. It should not be presumed that even such a sharp fall in the real wage rate would be enough to eliminate unemployment in this setting. A worker's productivity at a low food wage may be so low that employers resist further wage cuts, as in the efficiency wage hypothesis. That will depend on the worker's other sources of consumption. Those among the poor with least non-labor endowments will be the ones left to starve, for they will find that their best wage offers are undercut by other people with endowments which can be consumed during the famine so as to raise their productivity to a competitive level (Dasgupta and Ray 1986; McGregor 1990; Dasgupta 1993).³³ Labor market responses during a famine may thus entail a "double whammy" for very poor people—their consumption falls directly because of the higher price of food, and it falls indirectly through the income effect (both on wages and employment) of their diminished productivity. This type of labor-market response can readily generate the type of nonlinear dynamics in the evolution of poor people's consumptions and multiple equilibria discussed in Section II. A variety of dynamic behaviors for consumption are then possible in response to a labor-demand shock, including downward spirally contractions. The dy-

³² Rizwanul Islam (1986) reviews evidence on this issue for Bangladesh.

³³ While there is evidence from micro studies that undernutrition reduces productivity, the empirical relevance of any downward wage-stickiness arising from such nutrition-based productivity effects has been questioned at normal times even in poor rural economies (Pranab Bardhan 1984, ch. 4; Anand Swamy, forthcoming; Subramanian and Deaton 1996). Nonetheless, it can be conjectured that these effects are likely to be more relevant during situations of unusually low wages, as often observed during famines.

namic entitlement failure can entail both higher unemployment and lower real wage rates (Carraro 1996).

Other markets are likely to matter to the transmission of aggregate shocks to the household level. With the pressure on informal credit and risk-sharing arrangements, and the highly covariate nature of the income shocks during famines, any existing formal credit markets will probably see rising interest rates or rationing. However, this is rarely mentioned in the literature, probably due to the fact that formal credit markets are already thin in famine-vulnerable economies, with borrowing constraints (particularly for the poor) being the rule rather than the exception.

With incomplete risk markets (entailing interdependence of production and consumption decisions), a production input such as livestock can be an important asset which helps protect the consumption of poor people. This is well documented for the pastoral economies of the Horn of Africa (Webb, von Braun, and Yohannes 1992; von Braun, Teklu, and Webb 1994) and the Sahel (M. Khan 1994). Rosenzweig and Wolpin (1993) find evidence that livestock is used for consumption smoothing in semi-arid areas of India. The highly covariate nature of the shock during a famine means that large numbers of people must simultaneously sell their livestock to buy foodgrains, with a consequent (often sharp) fall in livestock prices relative to foodgrains and other goods (Sen 1981; Marion Kelly 1992; Paul Ulrich 1993; von Braun, Teklu, and Webb 1994; M. Khan 1994). This may be exacerbated by panic selling of livestock in anticipation of falling prices.

There is still much we do not know about (food and nonfood) market performance during famines. We should

clearly not assume that free markets will help buffer an initial shock's impact on the poor. The extent to which markets help or hurt will depend on the nature of the market failures in normal times, and on how these interact with initial distribution and with the nature of the initial shock. What is needed most is further careful empirical work on how markets actually worked in these circumstances.

3. *The "Moral Economy" and Famines*

There are undoubtedly a great many people who would not have died in a famine if only they could have borrowed without rationing, at rates of interest which equated demand and supply for credit. Credit and risk markets in famine-vulnerable settings appear to be less than perfect at the best of times. And it is unlikely that they would work any better during a famine; indeed, there is (largely anecdotal) evidence that existing market and non-market institutions for credit and insurance perform less well during famines; patronage becomes scarce and "anti-social behavior" increases, such as renegeing on familial and village obligations;³⁴ "Patron-client relationships, already weak, are found virtually to snap during periods of severe food stress" (Bina Agarwal 1991, p. 207).³⁵

³⁴ The contraction or collapse of the various forms of traditional credit and risk-sharing (including patron-client) arrangements during famines or other food crises has been noted by Bangladesh Rural Advancement Committee (1979), Robert Dirks (1980), Alamgir (1980), Greenough (1982), Caldwell, Reddy, and Caldwell (1986), Megan Vaughan (1987), Frances D'Souza (1988), Agarwal (1991), John Field (1993a), and Alayne Adams (1993), among others.

³⁵ It has also been argued that the indigenous moral economy is eroded by the developing market economy, and that these are typically settings in which no formal (public) safety net exists to replace the moral economy; so longer-term vulnerability to famine can be increasing (see, for example, Sen's 1981, ch. 8, discussion of the erosion of

It is not surprising that famines can put considerable stress on normally sustainable—albeit imperfect—social arrangements for credit and insurance in poor economies. Village societies can cope to some extent with idiosyncratic risks through risk-pooling arrangements. Such arrangements will probably be less prone to moral hazard and adverse selection in traditional village and extended-family settings in which participants are well known to each other. Indeed, there have been claims from microeconomic investigations that indigenous risk-sharing arrangements in poor agrarian economies work well in practice, though there is conflicting evidence from the same data of sizable exposure to income shocks.³⁶ These arrangements cannot, however, be expected to cope with covariate shocks to the risk-sharing group, as are likely to be common in a famine. And even when the risk-sharing group is large, or there is a sizable idiosyncratic component to the shock, in famine-prone settings these arrangements must still be implementable without binding, legally enforceable contracts. This fact constrains performance for the poor, particularly in spells of transient poverty, or when the threat of destitution reduces the probability of continued participation in the social insurance game. Options outside the household and village may become more attractive.

So there can be no guarantee that

traditional support systems in the Sahelian economy). This topic takes us beyond the scope of the present paper. Further discussion can be found in Agarwal (1991), Jean-Phillipe Platteau (1991), and Osmani (1996).

³⁶Townsend (1994) argues that data for three Indian villages are consistent with near-perfect risk-sharing. However, on applying alternative estimation methods to the same primary data set, Ravallion and Shubham Chaudhuri (1997) find that consumptions are quite sensitive to income changes.

routine, mutually beneficial, cooperative behavior will survive a famine—that will depend on the initial conditions (including preferences) and the size of the shock. Some strands of the traditional network of support will break more easily than others; for example, Greenough (1982) notes that longer-term attachments were less likely to be broken during the Bengal famine. Nonetheless, simulations suggest that seemingly small perturbations to the parameters (the extent of risk-aversion and the discount rate) of a repeated informal insurance game among purely self-interested parties can entail a large change in the realizable gains (Stephen Coate and Ravallion 1993).

The disruption of community and familial reciprocity or benevolence is often (though not always) associated with migration (Jodha 1975; D'Souza 1988). It is not clear what is the cause and what is the effect here. When group-based insurance fails, migration is certainly one response. But migration can also help cause the breakdown, because the village-support game relies on repeated interaction among people who come to know and trust each other; the large scale migrations observed during many famines may mean, however, that new players come on the scene who are likely to treat it as a one-shot game. Again a rapid collapse of informal risk-sharing arrangements can be expected.

This point also illustrates the pervasive, but often neglected, *externalities* involved in famines. In various ways, individually rational responses to the threat of starvation (of which migration is one example) can aggregate into an enhancement of that threat. One way is through the disruption of socially based support mechanisms premised on a limited capacity for collective action; another way is through enhanced exposure

to infectious diseases in crowded relief camps. Individual efforts to cope with life-threatening hunger can escalate into an even greater aggregate threat. The view that mass starvation is just a simple sum of many individuals' independent hungers is questionable. However there is still little hard evidence on these issues.

4. *Failures of Public Action*

Even with well informed and well intentioned policies, governments and other agencies in poor countries can face severe infrastructural, administrative, and logistical constraints on their capacity for action. This has been a common problem in famines in underdeveloped or war-torn economies. Inadequate rural infrastructure and communications has often been identified as a contributing factor to famines, and a severe constraint on their relief.³⁷ Complex problems such as famines may so strain infrastructure and administrative capabilities that a sharp deterioration in performance becomes inevitable. This may well reflect past failures of public action (such as neglecting rural infrastructure).

There have also been serious short term public action failures. First there are policy failures resulting from faulty theories or misinformation. There have been many examples. The British Government's faith during the nineteenth century in non-intervention in food markets during famines almost certainly made matters worse, by deterring public action to improve on the distributional outcomes of unfettered markets (Ambirajan 1978; Rashid 1980; Drèze 1990). At the other extreme, the

forced collectivization of agriculture, and associated food procurement policies implemented under the Soviet Union's first five-year plan resulted in a severe famine in rural Ukraine in 1930s (Dalrymple 1964; Dando 1981). Similar policies in Ethiopia from the mid-1970s are believed to have contributed to the famine of the mid-1980s (Devereux 1993b, ch. 10). The collapse of food entitlements in China during 1959–61 is believed to have been instigated by the destructive effects on food production of the rapid industrialization policies implemented as part of the "Great Leap Forward," compounded by an urban bias in food distribution and failures of statistical reporting (Ashton et al. 1984; Riskin 1990; Lin and Yang 1995). Similarly, wartime policies enforcing rice-export quotas and the production of non-food crops contributed to the famine in Vietnam in 1943–45 (Bose 1990). Milder interventions have also gone badly wrong at times. There have been a number of descriptions of how governmental interventions in agricultural markets enhanced vulnerability to famines in Africa (Jansson, Harris, and Penrose 1987; Vaughan 1987; Simon Maxwell 1991; Stryker 1993). Other common examples of this type of public-action failure are the attempts made to prevent food or people moving in response to famines (Quddus and Rashid 1991; Devereux 1993b, ch. 10).

Secondly, there are public-action failures that arise when those in power may not share the objective of avoiding or relieving famines. In some famine-prone economies, the government's survival appears to have little to do with its ability to secure the basic consumption needs of those governed. Indeed, higher poverty during famines may often come side by side with absolute, as well as relative, gains to more powerful subgroups of the non-poor. Thus the

³⁷ See, for example, Drèze (1990) on famines in British India, Leonard Berry and Thomas Downing (1993) on droughts in Africa during the 1980s, and Jansson, Harris, and Penrose (1987) and Kumar (1990) on the Ethiopian famine of 1984–85.

incentives facing political leaders can work against effective famine avoidance or response.

An extreme, but not uncommon, form of this type of public-action failure is when a government knowingly uses famine as a weapon against its (external and internal) enemies (Dando 1981; David Keen 1991; Joanna Macrae and Anthony Zwi 1992; de Waal 1993). But even when the famine is not itself the weapon, it can be an entirely predictable by-product of governmental policies, such as when militarization destroys the ability of an economy and society to cope with drought (Devereux 1993b, ch. 10). Public-action failure through denial or obfuscation of the signs of famine has been associated with some of the worst famines in terms of lives lost, including the Ukraine famine of 1932–33 (Dalrymple 1964), and that in China during 1959–61 (Ashton et al. 1984; Riskin 1990); in both cases the government refused to acknowledge the problem, or to seek external assistance, and the outside world knew very little about it until many years later.

Within this category of deliberate public action failures are also examples in which the threat of famine was recognized, but for other reasons. It has been claimed that the host government during the Ethiopian famine in 1983–85 exploited perceived donor sympathy for the victims to lobby for famine aid intended for other purposes, or to free up foreign exchange for other purposes including buying weapons (Cutler 1993; Kloos and Lindtjörn 1993). And the problem need not be confined to the host governments. One major donor government is claimed to have used famine aid to Ethiopia as an instrument of foreign policy, with the aim of overturning a government it did not like on ideological grounds (Jack Shepherd 1993).

IV. *Famine Policies*

Famines demonstrate that market and non-market institutions cannot be relied upon to always operate in ways which will adequately buffer an external shock's impact at the individual level. Indeed, under certain conditions, considerable magnification of the shock is possible in the chain of events leading to famine. What are the lessons for policy, and research on policy?

1. *Better Governance*

The solution to some of the public-action failures identified in Section III is clear enough: base the policy response on a realistic and undogmatic assessment of how the specific economy works and build the physical and institutional capacity for making the response work. Examples of how this can be done are discussed later.

The solution to deliberate public action failures is less clear. One factor identified in recent literature is the extent to which information can flow freely and public pressure for action be expressed without recrimination. In addition to open formal political institutions, an independent press has been seen to have an important role in avoiding famines (Drèze and Sen 1989; N. Ram 1990). And the negative effects a government having the ability to suppress news and criticism have also been identified; for example, this appears to have been a contributing factor to the unusual severity of the Chinese famine of 1959–61 (Sen 1983) and the Ethiopian famine of 1984–85 (Peter Gill 1986; Jansson, Harris, and Penrose 1987). Also attempts to suppress information often come hand in hand with deliberate misinformation, such as unconvincing promises, which can even make matters worse by further destabilizing markets (Ravallion 1987; Quddus

and Rashid 1991). There is also evidence that democracy is instrumentally important to avoiding famines; in Africa since about 1980, more democratic countries have been less likely to have a famine (von Braun, Teklu, and Webb 1994), though that correlation is based on very few degrees of freedom (until 1990 only two or three countries in Sub-Saharan Africa could reasonably be called democratic).

However, while it is plausible that open political institutions and a free press constrain the scope for this type of deliberate public action failure, it is not clear what the policy instruments are here. The extent to which information and criticism can flow freely is often under the control of the same agents whose preferences inhibit famine relief.

External levers might be identified, if donors and international agencies were willing to apply appropriate conditionality to their aid and concessional lending. Multi-lateral aid agencies and (non-governmental and private) voluntary agencies can be trusted to have a firmer commitment to saving lives during a famine than some governments, though here too governments can try to manipulate or suppress these agencies, as has happened in relatively illiberal political environments (Adams 1993). Some of these agencies appear unaware of—or reticent to exploit—their own bargaining power to improve host-government policies, preferring instead to disburse famine aid as rapidly as possible without conditions. It should not be assumed that unquestioning handouts of “humanitarian aid” will best serve humanitarian ends.

Clearly more research is needed on the political and institutional dimensions of famine causation and relief. For now, it is believable that the increasing political liberalization we are seeing in

famine-prone economies will at least constrain the possibilities for these deliberate public action failures. Other constraints are also emerging; the “CNN factor” is one, whereby the international visual media can now zoom in rapidly on trouble spots even when the local regime is trying to suppress information. If these recent trends continue, then it is likely that political leaders will have a greater demand for sound economic analysis in formulating anti-famine policies. The rest of this section reviews issues pertaining to specific policies aimed at relieving and preventing future famines.

2. *Early Warning and Rapid Response*

Aggregate food availability has traditionally been the main indicator used for predicting famines. The recent literature has suggested that similar initial conditions of aggregate food supply can entail very different outcomes. Even a highly sophisticated forecasting model, and accurate data, may produce unreliable predictions of how much FAD will impact on the welfare of poor people in famine-vulnerable settings. What can be done?

Arguably the best place to look for signs of impending famine is in the variables which directly determine the entitlements of poor people (prices, wages, employment, and agricultural yields). Here the entitlements approach has influenced practical early-warning and monitoring methods, such as used by Oxfam (Young 1992). Much has been learnt about early-warning indicators by studying behavioral responses to contractions in food entitlements (W. I. Torry 1988; Corbett 1988; Kelly 1992; M. Khan 1994). Such research has revealed promising indicators in specific settings, although the degree of heterogeneity in behavioral responses even within one well defined area and socio-

economic group (let alone problems of data quality and administrative feasibility) has constrained efforts to find robust "universal" early warning indicators (Corbett 1988; Susanna Davies 1993).

The public response to early warnings must also be timely. Late responses are costly in lives and money. A greater reduction in mortality can generally be achieved with given aid if it is distributed more evenly over time (given the likely concavity of the survival function, as discussed in Section II). Adverse effects on producers' future price expectations and, hence, future food availability can also be reduced with a more timely response. Often, however, the costs of a delayed response are not incurred by those making the decision of when to respond. For example, various distress signals (consumption of wild foods, unusual migration, selling of livestock to buy food, and high food prices) were evident for at least 12 months prior to the main external interventions in Ethiopia in late 1984 (Gill 1986; Jansson, Harris, and Penrose 1987; Kumar 1990).

There are examples of how rapid and effective public responses to signs of famine have almost certainly averted disaster. These include Kenya and Botswana in the mid-1980s, and Bangladesh in 1979 and 1984. But among famine-vulnerable countries, post-Independence India has provided the most well documented examples of effective early warning and public response. The Famine Codes developed in the nineteenth century originally relied largely on monitoring foodgrain supply indicators (such as failed rains), though this broadened to include food prices and unusual population movements. The Madras Famine Code of 1883 recommended monitoring grain prices as an indicator of famine (Rangasami 1985),

and the Bengal Famine Code of 1918 outlined an elaborate early warning system (Currey 1984). These Famine Codes formed the germ of the post-Independence early warning system, but the public response system was developed greatly (Government of India 1989). Local administrators report signs of famine; their efforts are monitored, and an open press is rarely reticent to play a "watchdog" role (Ram 1990). Local officials maintain the capability for rapid response. The administrative integration of warning and response functions, combined with political will and a free press, have undoubtedly been important to India's success at avoiding famines since Independence, despite numerous droughts (Drèze 1990). However, as a number of observers have noted, India's success at fighting chronic poverty and hunger has been more disappointing.

3. *On the Role of Aggregate Food Availability*

It has been argued that an increase in aggregate food availability is not called for to stop a famine which was not itself caused by a decline in aggregate availability (Bowbrick 1986). And the belief seems to have occasionally been put into practice. For example, the sluggish response of some aid agencies to early warnings of the 1983–85 famine in Ethiopia has been attributed to their assumption that private food surpluses in the country were sufficient to maintain aggregate consumption, in spite of the drought (Gill 1986).³⁸ Of course, the aid agency's *ex ante* assessment of food supply is bound to be imprecise and it now appears likely that availability was seri-

³⁸ Another well documented example is the Great Bengal Famine of 1943 in which the sluggish response from the authorities appears to have been due in part to the fact that they could find little sign of FAD (Sen 1981, ch. 6).

ously low in Ethiopia in 1984–85 (Kumar 1990). But that is not the issue here. Even if aggregate domestic availability is not threatened, can there be a case for emergency interventions aimed at increasing the supply of food to the domestic economy in response to signs of an increase in starvation?

A number of arguments can be made in favor of increasing aggregate food availability in response to a famine, even if it not caused by FAD.³⁹ Consider the stylized case of starvation arising from an adverse shift in food distribution, as a result of which the poor end up with a lower share of an unchanged aggregate. In principle, the absolute consumption levels of the poor could be restored *either* by restoring the previous food distribution function, *or* by increasing aggregate availability. It is not difficult to imagine situations in which the first option is unfeasible in the (crucial) short run.

To give another illustration, suppose that private storage is deemed to be excessive. A government can try to deal with this by sending the police out to bash up “hoarders,” as happened, for example, during the Bangladesh famine. This may work, but one suspects that it is more effective as a public relations exercise than as a means of increasing current food consumption. And one must also appreciate the importance of the government’s behavior to the formation of stockholders’ price expectations. In these circumstances, the immediate goal should be to take actions which lead stockholders to revise downwards their expectations of future prices. A believable undertaking to import food would almost certainly do this.

Is there also a case for promoting do-

mestic food production as part of a longer-term strategy for preventing famines? The role of commercialization of agriculture and the promotion of export crops (both food and non-food) has been much debated. It is sometimes argued that this will divert resources away from the domestic production of food, and expose poor farmers to even greater risk of food entitlement failure (see, for example, Frances Lappe and Joseph Collins 1977). There have been cases in which a new export crop has increased exposure to risk; groundnut in the West African Sahel is an example (Devereux 1993b, ch. 9). However, as a generalization, the view that export-crop production creates famines is questionable; if by producing a cash crop instead the rural poor can afford to buy more food, and the markets and infrastructure are adequate for getting the food to them from elsewhere, then that will reduce their vulnerability to famine.⁴⁰ Similar comments apply to the idea that the highest priority for famine-vulnerable areas is to promote food production so as to be self-sufficient in food; in regions where the land is much more suitable to cash crops that can be a formulae for a severe food entitlement failure. Nor does self-sufficiency in food appear to be an ecologically sound principle for tropical agriculture (P. F. Stewart 1988).

Agriculture and rural development can play an important role in reducing vulnerability to famine, both in providing extra insurance (such as through agricultural diversification, and non-farm jobs in lean seasons) and longer-term development. Unfortunately, past development policies (both pricing and spending) have typically been bi-

³⁹ Contrary to the claims of Bowbrick, that is entirely consistent with Sen’s (1981) arguments.

⁴⁰ For evidence on the effects of agricultural commercialization on poverty and hunger see the various papers in von Braun and Eileen Kennedy (1994).

ased against this sector (Lipton 1977; Anne Krueger, Maurice Schiff, and Alberto Valdéz 1988). The policy lesson is clear.

4. *Distribution Policies*

Although the case is often strong for increasing aggregate food availability during a famine, food handouts need not be the best form of intervention from the point of view of minimizing mortality. Cash or coupon payments to potential famine victims can provide more effective relief than the usual policy of importing and distributing food (Reutlinger 1988; Drèze and Sen 1989; Coate 1989; Sen 1990; Maxwell and G. Templer 1994). Under competitive conditions, the case in favor of cash relief is strong if either food prices in the affected region are below world prices at the border (because, of course, recipients will then be able to purchase more food locally with the cash aid than the aid agency can obtain with the same money on world markets) or if private traders can deliver the food more efficiently than the aid agency. Some observers have seen that traders get the food to affected areas quicker than governments or aid agencies.⁴¹ The case in favor of cash relief is less obvious if local food markets perform poorly, though even then the policy switch may be desirable; for example, cash relief can result in lower mortality than direct food aid even if the local food trade is monopolized, provided that (among other conditions) traders can still deliver food at lower cost than the aid agency (Coate 1989). Savings in storage and handling costs can mean that cash has a higher transfer benefit to recipients. It can also help avoid the need for recipients to congregate in crowded and

⁴¹ See Caldwell and Caldwell (1992), referring to the drought in the Sahel in the early 1970s.

unhealthy relief camps. The rapid monetization of food aid to finance entitlement-protection programs has helped some famine-prone countries better avoid famines.⁴² However, donor restrictions on monetizing food aid remain common.

Whether in the form of food or cash relief, the effect of aid on mortality will depend greatly on how it is distributed over time and between people. Governments and agencies involved in famine relief face the problem of how to allocate a fixed quantity of emergency food aid. Indicators of aggregate food availability in specific regions are sometimes used, though (for the same reasons that FAD is questionable theory of famine causation) this may not mean that the transfers go to those in greatest need, and there is at least one documented case in which focusing on local foodgrain output shortfalls led the aid agency to miss those in greatest need (Webb and Thomas Reardon, 1992, on the 1983/84 drought in Burkina Faso).

Food allocation according to more direct indicators of "need" is often advocated and used, and guidelines for doing so have been laid down by some NGOs and UN agencies.⁴³ In practice this often means that handouts are based on readily observed individual or group attributes such as assessments of age, height, and weight. This would seem more likely to achieve better outcomes than targeting according to food output shortfalls, though finer targeting can also entail higher costs; we know lit-

⁴² See Drèze and Sen's (1989) discussion of Cape Verde's policies in which food aid is sold on open markets and used to finance cash transfers for protecting the command over food of poor people in the presence of severe droughts.

⁴³ For example, the Oxfam Health Unit (1984) advocates the use of need indicators such as weight-for-height indicators. Also see Seaman and Rivers (1988) and Young (1992).

tle about the precise tradeoffs involved during famines.

A thorny question arises in this context. As a general rule, the mortality minimizing allocation of a given supply of food over a population will equalize the food consumption slope of the survival function across all persons. The optimal allocation to each person will be implicitly a function of relevant personal attributes, interpretable as each person's "needs" (Ravallion 1987, ch. 7). Implementing an (unconstrained) optimal allocation of given aid may be very far from being feasible in practice. However, it is not even clear that an optimal allocation from the point of view of aggregate mortality would look much like the guidelines typically laid down. There can be no general presumption that the mortality minimizing handout of food or cash is an increasing function of need. Indeed, the opposite will hold whenever persons in greater need have lower consumption slopes of their survival functions.⁴⁴ On moral grounds one may prefer to give more food to those in greater need, but one may also have to come to terms morally with the fact that this could well involve more people dying than strictly necessary with the given amount of food available.

Direct intervention to improve health—such as through disease treatment and control, water purification, and improved sanitation—will not only reduce mortality directly, but may entail that other policies which enhance food entitlements will have larger marginal impacts on survival prospects. If so, then the converse will also hold; in various ways greater command over

food will enhance the impact of health-based interventions.⁴⁵ Or effective (cash or food) transfers may obviate the need for health-based intervention, such as when relief reaches villagers before migration begins, thus reducing the need for crowded relief camps where infection becomes more likely. The literature contains discussions of such synergies between health and more conventional food- or cash-based interventions (see for example Young and Jaspers 1995). But as yet the relationships are not well understood, or quantified to a point where one can give firm guidance on the priorities that should be attached to each mode of intervention when aiming to minimize famine mortality.

The administrative capability for implementing indicator-based targeting of interventions during famines is limited in many settings. This has led to extensive use of one of the oldest forms of famine relief policy, namely the provision of unskilled employment to anyone who wants it at low wages on public works projects.⁴⁶ The attraction of this policy has not been the value of the outputs produced, but its incentive effects, notably the potential for "self-targeting" (given that those not in need are unlikely to want to do such work at the wages offered) and that incentives for escaping poverty by other means are preserved (Timothy Besley and Coate 1992). Furthermore, in famines arising from a collapse of employment, the

⁴⁵ Non-food goods may also matter; for example, Rivers (1988) argues that better clothing and shelter will reduce nutritional requirements.

⁴⁶ Though intervention in food markets was discouraged, relief works schemes were prominent in the "Famine Codes" in British India (Bhatia 1963; Drèze 1990). The aim was to provide local employment at a subsistence wage to all who wanted it. On the use of this policy in famines in Africa see Drèze (1990) and von Braun, Teklu, and Webb (1994, ch. 8). For a survey of the literature on these schemes see Ravallion (1991).

⁴⁴ This does not require nonconvexities leading to corner solutions, in which some are left to die. The solution may be an interior one, but with heterogeneity in marginal impacts of consumption on survival prospects. For an analysis of a related problem in targeting see Michael Keen (1992).

forgone incomes of relief-work participants will be low, and hence the relief can be cost-effective. By allowing a separation of those able to work from those not, and by targeting on other indicators of need among the latter group, this type of policy can be an important component of a comprehensive relief strategy (Drèze and Sen 1989).

The body of experience and evidence on public works schemes offers compelling support for the belief that they can have an important role in famine relief. That does not mean that they will always be the most cost effective option; if the intervention is delayed too long then the poorest may be least fit to work; and under certain conditions forgone incomes and non-wage costs may mean that such schemes will only dominate informationally feasible alternatives if the assets created have sufficient value to the poor, such as by helping to prevent the deterioration of rural infrastructure and other assets during the famine (Ravallion and Datt 1995). There have been remarkably few rigorous evaluations of the gains to the poor from specific safety net interventions in poor countries.

Recent literature has also emphasized the limitations of analyzing relief policy options in partial equilibrium terms; an income transfer is often assumed to leave all prices and other sources of income unchanged. This is unlikely to hold when considering widespread transfers of income in market economies. In distorted economies, transfers can have significant multiplier effects on the incomes of the poor. For example, in a dualistic economy with mobility between a rural sector and an urban sector with unemployment, the multiplier effect from transfers to the rural poor will be large when the wage elasticity of demand for labor in agriculture is low (Ravallion 1990b). There appears

to be potential for exploiting such general equilibrium multiplier effects in policy design aimed at achieving the most cost effective relief aid. For example, relief work is generally confined to alleviating poverty from rural unemployment in lean periods. This may reduce the transfer benefit to the poor, once market responses are considered. Indeed, under this restriction, the policy cannot be expected to achieve the most cost effective aid—in the sense of maximizing the recipient's transfer benefit for a given outlay on the policy.

5. *Stabilization Policies*

Public buffer stocks have been a popular stabilization policy. Stocks are raised (lowered) when aggregate food availability is high (low). The size of the stock needed, and hence the cost of the scheme, will depend on the degree of stabilization desired and how private storage decisions respond (Newbery and Stiglitz 1981). By stabilizing prices, such policies reduce incentives for private speculation. And so private storage will be displaced. The extent of this will depend on the way foodgrain markets work. At one extreme, buffer stocks will generally be ineffective as price stabilizers in competitive markets in which agents hold rational expectations of price movements. But plausible market imperfections may or may not enhance the case for stabilization through a conventional buffer stock policy. For example, the specific informational inefficiencies suggested by the evidence for Bangladesh imply clear limits to the use of this type of policy due to the potential for speculative attack during famines.⁴⁷ The lesson is clear: it is crucial

⁴⁷ The usual policy of selling from buffer stocks at times of high prices, may fail at sufficiently low levels of public storage. Indeed, at times of high prices, if public stocks are believed to be so low as to generate highly inflated expectations of future

that the markets are confident that future food supply is secure.

Trade is another way of doing so. Unrestricted international trade has been advocated as an alternative famine relief policy to buffer stocks (Reutlinger 1982; World Bank 1986). The essence of the argument is deceptively simple: by raising the local food price, shocks to domestic consumption opportunities should be at least partly offset by an increase in imports or fall in exports provided that trade is unrestricted. Here too qualifications are called for. First, trade can have the opposite effect in a "slump famine" (Sen 1981) in which the proximate cause of the famine is an endowment collapse rather than an increase in the local price of food; then the income effects in the famine-affected region may well entail food export.⁴⁸ Cash relief can help here in preventing food export (Drèze and Sen 1989; Sen 1990). Second, even when trade stabilizes aggregate consumption, it may destabilize the consumptions of certain subgroups of the population; the effects of free trade on the interpersonal distribution of consumption are also of concern. If (as is common) restrictions on trade are used to keep domestic food prices below world prices then free trade could well have adverse short run effects on

distribution. There may well be a significant adjustment problem, leading to increased vulnerability of certain groups in the short term. Further research is needed on the dynamics of such effects.

An effective but affordable (and hence sustainable) stabilization policy in famine-prone economies with poor infrastructure will probably combine buffer stocks and regulated trade. Emergency stocks can be held in key locations, notably where vulnerable groups are found and transport is a serious problem. And a relatively open external trade regime should be allowed for foodgrains. This will probably require regulation through stabilizing trade taxes (rather than quantitative restrictions) to avoid high domestic exposure to fluctuating world prices and it may need to be backed up by a monetary fund for emergency food imports, such as through the IMF's Compensatory and Contingent Financing Facility (Barbara Huddleston et al. 1984). None of these policy options come with guarantees. Problems of under-funding, poor management, and lack of integration with the early warning system can greatly reduce the gains from stabilization policies.⁴⁹ Yet there have been successes too. By combining such stabilization schemes with relief work schemes or other targeted transfers (as discussed above) famines have been avoided in economies facing the shocks which might otherwise have spelt disaster.⁵⁰

prices in response to supply shocks then a further reduction in the public stock will be price destabilizing. The Bangladesh government's efforts to raise public confidence in its stock and trade position during 1974 may well have been its (albeit unsuccessful) response to a plausible form of informational inefficiency in rice markets (Ravallion 1987, ch. 7).

⁴⁸ The often-quoted example of this effect is for British India around the turn of this century. External trade was unrestricted, and the subcontinent was a net exporter of foodgrains. However, while income effects dampened the stabilizing response of trade in this period, trade was still consumption stabilizing in its effect (Ravallion 1987, ch. 7).

⁴⁹ See, for example, Stephen Jones' (1994) discussion of Ethiopia's food grain reserve policy.

⁵⁰ Well-documented recent examples include Maharashtra in Western India during 1970-73, Cape Verde during the 1970s, Kenya during the mid-1980s, Zimbabwe in the early 1980s, Botswana in both the early and late 1980s (Drèze and Sen 1989; Drèze 1990), Ethiopia in 1987 (Kloos and Lindtjörn 1993), and Bangladesh in 1979 and 1984 (Ben Crow 1984; Osmani 1990).

6. *Tradeoffs?*⁵¹

Comprehensive poverty reduction strategies for low-income countries rightly emphasize the role played by social safety nets even in growing economies.⁵¹ Policy makers may be very willing to forgo other objectives of development to assure greater security against famines. However, it is far from obvious that effective policies against famine entail a positive cost to other commonly espoused objectives of development, including economic growth and environmental protection.

The literature on famines reviewed here has suggested that failures of both market and non-market institutions lie at the heart of famine causation; so it can be argued that famines can be ameliorated by longer-term development policies which strengthen the social and economic institutions (both governmental and non-governmental) which help protect poor people from economy-wide shocks.

Evidence in the famines literature and elsewhere also suggests that an effective social safety net for protecting poor households from severe shocks is consistent with longer-term goals of economic growth and environmental protection. Arguments that greater current security against famine can promote growth have come from two main sources. First, it can be argued that credit constraints make it difficult for survivors to restore their productive assets after the famine, entailing irreversible lasting damage to livelihoods (Jodha 1975; Agarwal 1991; Osmani 1996). Yet without an adequate safety net some will be forced into drawing down their productive assets. There is some evidence that famines have re-

sulted in an increase in wealth inequality, through increased concentration of land ownership (Azizur Khan 1977; Alamgir 1980; both on Bangladesh) and livestock in pastoral regions of Africa (Osmani 1996). Thus, after the famine the economy will have a higher number of credit-constrained households who are unable to take up productive investments in physical and human capital. There is some evidence from cross-country studies that higher initial inequality entails lower subsequent growth rates (see the Michael Bruno, Ravallion, and Lyn Squire 1995 survey).

Putting these pieces together, it can be conjectured that temporary famines can create more permanent distributional shifts which entail lower long term growth rates. By the same reasoning, a safety net which can prevent the depletion of productive assets by poor people will entail a higher longer term rate of both growth and poverty reduction.

The second source of evidence comes from normal (non-famine) times in settings like those in which famines have occurred. There has been recent compelling evidence from microeconomic investigations that exposure to uninsured risk influences poor peoples' investment decisions and, hence, prospects of escaping poverty (Rosenzweig and Binswanger 1993; Rosenzweig and Wolpin 1993; Jonathan Morduch 1993, 1994; Chaudhuri 1994). For example, even though expected income may be higher from a new seed variety, extra exposure to uninsured risk may prevent adoption.

While the above arguments and empirical results are suggestive, more research is needed on the ways in which uninsured risks and borrowing constraints handicap the longer escape from poverty. What we seem to lack most at present is a credible assessment

⁵¹ See, for example, World Bank (1990, ch. 6), Lipton and Ravallion (1995), and Binswanger and Pierre Landell-Mills (1995).

of the likely dynamic gains from safety-net interventions, so as to better inform public choices about how much to invest in such policies. Even if we found no longer term gains, we would still want to prevent famines. However, it is not implausible that a number of the policies discussed above for achieving better protection for poor people—as part of a famine relief strategy—will enhance the future prospects of escaping poverty. Whether that argument is right in practice, and what quantitative gains can be expected from specific interventions, will of course depend on how effective the specific interventions are in protecting poor people, as well as the extent of the dynamic gains from extra insurance. Further research on this topic could have important implications for assessments of the case for safety-net policies.

There are potential synergies with other aspects of development policy. Improved infrastructure (both better roads and marketing arrangements) has also been identified as a key factor in the success stories in reducing vulnerability to famines.⁵² Having good rural roads will certainly not guarantee that the available food will get to those in need, or even that it will move in the right direction, but without them there may be little chance of it doing so. Besides promoting food-market integration, there is evidence to suggest that improved rural transport allows a diversification of rural income sources, reducing risk *and* promoting both farm

⁵² Walter and Schofield (1989) argue that in England by the late seventeenth century improved farming methods and better spatial integration of food markets due to improved transport and marketing had resulted in higher farm yields and more diversified food production in the country as a whole, and greater protection from localized and crop-specific harvest failures. In parts of continental Europe, however, progress on all these fronts had been slower, and vulnerability to famines persisted.

and non-farm growth.⁵³ A similar comment applies to certain policies for promoting agricultural and rural development, such as reducing the (direct and indirect) taxation of agriculture, and certain human resource interventions.⁵⁴ There probably will be some changes in priorities if one aims to prevent famines. But because past policies do not appear to have been growth maximizing, the growth cost of the required change in policies need not even be positive.

What about the environmental consequences? It has been argued that vulnerability to famines is increased by the lack of well-defined property rights, and the failures of other means of assuring quasi-cooperative solutions to the problem of allocating common-property resources (Dasgupta and Karl Møler 1995). In pastoral economies, overgrazing can result, and the open-access problem often also underlies the process of deforestation. When these processes have continued over a long period, the ecological system has little

⁵³ On the positive effects of infrastructure on agricultural output in India see Binswanger, Khandker, and Rosenzweig (1993). Datt and Ravallion (forthcoming) find that states of India with better rural infrastructure saw higher longer-term rates of rural poverty reduction, controlling for other differences in initial conditions and exogenous time-varying factors. Also see McAlpin (1983) who argues more informally that the diminished vulnerability to droughts in India during the first 20 years of this century was due in part to rural infrastructure development (including the expansion of the railways). (Though also see the comments by Appadurai 1984; and Rangasami 1990.) A not dissimilar story can be told about Indonesian economic development since the 1970s; Indonesia was probably as vulnerable to famines as Bangladesh in the 1960s, but this has changed greatly, and rural development (particularly in Java) appears to have had an important role (Ravallion 1995).

⁵⁴ On the taxation of agriculture see Krueger, Schiff, and Valdes (1988). On human resource policies see Behrman's (1990) survey. For more general discussions see World Bank (1990), Dasgupta (1993), and Lipton and Ravallion (1995).

resistance. If individual and social coping strategies also fail then the people who depend on that ecological system can be extremely vulnerable to even a modest drought. The ensuing famine can itself entail ecological upheaval; for example, mass migration can have devastating environmental effects. These arguments suggest that environmental-protection policies can be viewed as complementary to reducing famine vulnerability in the longer term.

There are a number of other potential synergies between policies to protect from extremes such as famines, and longer-term progress in other aspects of development. Some of the more effective social safety nets for alleviating poverty in non-famine times evolved out of experience in famines. Examples include the "Employment Guarantee Scheme" in the Indian state of Maharashtra which evolved out of the famine relief efforts in the early 1970s, and the targeted food distribution and cash transfers found in Botswana (Drèze and Sen 1989). Recent discussions of disaster-relief policy have also emphasized the synergy with longer-term development goals (Mary Anderson and Peter Woodrow 1989).

With limited resources, many sharp tradeoffs will undoubtedly be faced in detailed policy choices. But it should not be presumed that effective policies for reducing vulnerability to famines will come at a cost to other development objectives. While a strict separation of "relief" and "development" is clearly untenable, a far deeper understanding is still needed of the extent and nature of the synergies. Public action to prevent famines need not wait for the results of that research. But it is research that could matter greatly to a proper assessment of the extent of the world's public resources that should be devoted to the task.

V. Conclusions

Famines have defied simple explanations as well as geographic boundaries. They have happened under both socialist and capitalist economic systems. They have happened with and without declines in food supply, and with and without wars or unusual political or social instability. An objective and holistic view of the determinants of individual survival prospects in economies under stress offers the greatest hope of understanding why famines happen, and of usefully informing domestic and international public action on how best to avoid or relieve them. That is the main insight that economic analysis can offer to replace the heavy reliance in the past on often doubtful "single-cause" explanations for famines.

Economic analysis can help understand famines. But economists can also learn from famines. While they are dramatic events, they can start quite undramatically. Under certain conditions, the threat of mass starvation can emerge from seemingly small shocks to an economy, or from a steady—even slow—decline in average living standards. And similar, even large, shocks in similar settings can have very different consequences. Market and non-market (including governmental) institutions which work quite adequately, though not perfectly, in normal times can easily turn even a moderate aggregate shock into a devastating blow to some poor people.

Famine can thus be viewed as a tragic magnification of normal market and governmental failures. The nonlinearities, cumulative effects, and aperiodic behavior, that can transform a shock into mass starvation appear to be intrinsic features of quite normal economies—rather than peculiar features of highly distorted or badly damaged

economies. They are there always, but normally hidden from view. And they can surface in any number of ways.

While famines do not lend themselves to easy prediction, there are some common elements. Entitlement failure is one. While famines have happened with and without crop failures, every famine appears to have entailed a collapse in the legal command over food of at least some subgroups within society, either through a loss of endowment or a contraction in the amount of food that can be acquired from given endowments.

Looking deeper into the causes of entitlement failure we also see some common elements albeit at a more aggregate level. Weak social and physical infrastructure, weak unprepared government, and a relatively closed political regime, all enhance vulnerability to famine. Arguably the same factors constrain longer-term poverty reduction. Recognizing the contingent nature of the market and institutional failures that underlie famines points to implications for both their relief and prevention. And it is doubtful that effective policies for preventing famines come at any significant, or even positive, cost in terms of other development objectives.

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