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Thomas Plümper (Essex)

Eric Neumayer (LSE)

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Thomas Plümper[a] and Eric Neumayer[b]

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a Department of Government, University of Essex, Colchester CO4 3SQ, UK and Max-Planck Institute of Economics, Jena, tpluem@essex.ac.uk

b Department of Geography and Environment, London School of Economics and Political Science (LSE), London WC2A 2AE, UK and Centre for the Study of Civil War, International Peace Research Institute Oslo (PRIO), e.neumayer@lse.ac.uk

**Abstract**

Famine mortality is preventable by government action and yet some famines kill. Amartya Sen has famously stated that no famine with significant excess mortality has ever occurred in a democracy. Yet, critics have argued that some countries have experienced famine mortality despite democratic governance and that Sen's hypothesis cannot account for the conditions under which even autocracies may prevent famine mortality. We develop a political theory of famine mortality, which suggests that it can be entirely politically rational for a political support maximizing government, democratic or not, to remain inactive in the face of severe famine threat. Differences in famine mortality are due to differences in the policies democracies and autocracies adopt in responding to this political trade-off. Autocracies are more likely to compensate only affected elite members by targeted transfers, leaving other affected individuals outside the elite vulnerable to the potentially mortal impact of famine. Democracies, however, need to employ policies with quasi-public good characteristics due to the larger number of affected individuals with political influence. We derive the testable hypotheses that famine mortality is possible in democracies, but likely to be lower than in autocracies. Moreover, a larger share of people being affected by famine relative to population size together with large quantities of international food aid being available will lower mortality in both regime types, but more so in democracies. Our hypotheses find empirical support in a cross-country time-series analysis of famine mortality in non-developed countries over the period 1972 to 2000.

## 1. Introduction

Modern famine scholarship regards famine mortality as entirely preventable by governments. If so, the question is why in the 20th century alone between 70 and 80 million people may have died in famines (Devereux 2000: 7). In this article we study why governments sometimes fail to prevent excess mortality from famines. Amartya Sen has famously argued that democratic governments always prevent substantial famine mortality.[1] Yet, this can neither account for why some countries have experienced some famine mortality despite democratic government, nor can it explain under which conditions even autocratic governments prevent famine mortality (Keen 1994a; de Waal 2000; Woo-Cumings 2002). In this article we take up the challenge of tackling these unsolved questions.

To do so, we develop a political theory of famine mortality, which suggests that governmental inaction in the face of a severe famine threat can be the rational outcome of a political support maximization calculus. We describe the government's response choice in the wake of a famine threat as a typical dilemma. On the one hand, the government will lose political support if it remains idle. On the other hand, however, governmental action comes at a cost to some unaffected individuals in the form of, for example, higher food prices or taxes. In other words, government action against famines means that the unaffected have to pay for 'bailing-out' those affected by famine. Governments may rationally fail to act against famines when the political costs of action are higher than the political costs of inaction. We do not argue that political inactivity is likely.[2] In fact, the higher the share of famine affected people among the population, the more likely government intervention becomes. However, we argue

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[1] See, for example, Sen (1994:34), which states that '…one of the remarkable facts in the terrible history of famine is that no substantial famine has ever occurred in a country with a democratic form of government and a relatively free press'.

[2] In fact, we will see below that famine mortality is a rare event.

that political inactivity is possible and – indeed – there is a political rationale behind it when it happens.

Importantly, our argument is that both democracies and autocracies face the trade-off just described, which explains why some famine mortality is possible in democracies as well. Differences in the amount of famine mortality between democracies and autocracies stem from different kinds of policies used in response to this trade-off, which follow from the differences in the relative influence of an elite versus the broader population in the two regime types. Given the larger relative influence of a small elite in autocracies, autocratic governments may well find it support-maximizing to use targeted transfers that shield the small affected group of the elite from the direct and indirect consequences of famine. Such targeted transfers leave those people affected by famine, but outside the elite, vulnerable to the mortal impact of famine. In democracies, the larger number of those with political influence in need of assistance means that such targeted transfers are not feasible, unless the share of affected people is very small. Democracies are therefore more likely to use policies that benefit all affected people, not just targeted transfers for the benefit of a small elite.[3] Both democracies and autocracies can employ international food aid to lower the political costs of government action because people affected by the famine can be helped without major (short-run) costs to those unaffected. However, democracies are more likely to channel international food aid to

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[3] This prediction of our theory resembles a finding put forward in the work on *The Logic of Political Survival* by de Mesquita et al. (2002, 2003). They summarize their theory as follows (de Mesquita et al. 2002: 581): 'Our main deductive predictions relate to the quantity and quality of public policy provision. In particular, because democrats rely on large winning coalitions, they must provide more public goods.' Similarly: 'If political participation is severely restricted, governments rationally choose rents as an instrument to buy political support. With growing democracy, however, the provision of public goods becomes more and more efficient in ensuring that the government remains in power.' Empirical evidence for these claims is summarized by Lake and Baum (2001).

all affected people, whereas autocracies are likely to appropriate large parts of the aid to the private benefit of the small elite, leaving those outside the elite again vulnerable to the mortal impact of famine.

Our probabilistic political theory of famine mortality leads to the expectation that famine mortality in democracies, whilst likely to be lower than in autocracies, is still possible. Furthermore, democracies act more decisively against famines than autocracies with policies aimed at preventing harm from all people affected by famine the larger the share of affected people to the total population and the higher the level of international food aid available. These hypotheses find support in our empirical test of famine mortality in a cross-national time-series analysis of a sample consisting of 130 non-developed countries over the period 1972 to 2000.[4]

The remainder of this article is structured as follows: The next section briefly reviews theories of famine. We then discuss two famine cases from India and North Korea, respectively, that illustrate the interplay between regime type, international food aid and famine. We continue by developing our political theory of famine mortality. The hypotheses derived from our theory are then subjected to empirical analysis. We conclude by indicating areas for future research and by identifying policy implications following from our analysis.

## 2. Famine Mortality and Democracy: A Review of Previous Arguments

The field of famine studies is not one of great consensus among scholars. In fact, there is widespread disagreement about most relevant issues, including the very definition of what constitutes a famine (Devereux 1993; Howe 2002; Howe and Devereux 2004). Whatever the exact definition, it is important to distinguish famine, which according to Sen (2001: 160)

[4] The developed countries of Northern America, Western Europe, Japan, Australia and New Zealand are food aid donors, not recipients.

involves ‘a sudden eruption of severe deprivation for a considerable section of the population’, from problems of general malnourishment and endemic hunger.

Putting it bluntly, one can distinguish between famine theorizing before and after Sen. Early explanations treated famines as the inevitable consequence of a sudden decline in food supply (Devereux 1993, ch. 4). A good example is Brown and Eckholm’s (1974: 25) verdict that ‘a sudden, sharp reduction in the food supply in any particular geographic locale has usually resulted in widespread hunger and famine’. Typically, though not always, the fall in food supply was seen as being caused by persistent droughts, floods and other natural calamities. Famines had the notion of an unavoidable exogenous shock, an act of nature. Aykroyd (1974: 1) portrays a common cause for famine as follows: ‘two years of poor rainfall may be followed by a third year without any rain at all. It is then that famine makes its appearance…’. Nnoli (1989: 170) in a similarly deterministic and inevitable fashion regards a prolonged drought as leading to famine. Combined with the Malthusian concern that populations have the tendency to outgrow the ‘carrying capacity’ of their land (Malthus 1798), the threat of famine is easily summarized as ‘too many mouths and too little food’ (Aykroyd 1974: 5).

Second generation explanations contested this implicit claim that famines are beyond human scope. Amartya Sen is not the only representative of such theories of course, but the most prominent one (see, for example, Sen 1976, 1981, 1985; Drèze and Sen 1989, 1990). The famous opening sentences of his book on *Poverty and Famines* proclaim: ‘Starvation is the characteristic of some people not *having* enough food to eat. It is not the characteristic of there *being* not enough food to eat.’ (Sen 1981: 2, emphasis in original). It follows that food shortage may be a necessary but not a sufficient condition for the outbreak of famines. What really matters are entitlements (the command over food and non-food commodities), not food availability as such. Famines happen when groups of individuals experience entitlement collapse and are no longer able to buy sufficient amounts of food.

Famine theorizing after Sen has contested many aspects of Sen's writings. In fact, the recognition and admiration his work has received across the wider social sciences is only rivaled by the criticism, opposition and, at times, fury it has encountered as well (see, for example, Rangasami 1985; Bowbrick 1986; de Waal 1989, 1997; Keen 1994a, 1994b). It would be far beyond the scope of this article to survey and critically engage with the detailed controversies.[5] Much of the criticism has concentrated on how Sen's 'entitlement failure' theory is seemingly ill-equipped to explain the modern conflict-related famines of sub-Saharan Africa. In these conflicts entitlement collapse might still apply, but it often occurs through extra-market violent appropriation, what some call 'asset transfer' (Duffield 1994) or 'asset-stripping' (de Waal 1993), whereas Sen stresses entitlement collapse within the rule of law and functioning markets.

Interestingly, these critics do not doubt Sen and Drèze's contention that 'all famines in the modern world are preventable by human action' and that large-scale famine mortality must be due to 'some massive social failure' (Drèze and Sen 1989: 47). In other words: public action can reduce or even avoid famine mortality, for example, in the form of free or subsidized provision of food, the creation of (temporary) employment and income opportunities for affected people, the control of epidemics and the provision of health services. Indeed, Sen (2001: 175) believes that famines are 'so easy to prevent that it is amazing that they are allowed to occur at all'. This agrees with the belief advanced by, for example, von Braun et al. (1998: 2) that 'famine is largely a function of institutional, organizational, and policy failure, not just one of generalizable market- and climate-driven production failure' (emphasis in original), with Devereux's (2000: 27) assessment that 'famines occur because they are not prevented: they are allowed to happen' as well as with de Waal's (2000: 18) argument 'that any government can, if it so desires, take effective measures to combat famine'.

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[5] Others have done so to some extent (see, for example, Ravallion 1997 and Devereux 2001).

Yet, political scientists know astonishingly little about the conditions under which governments will prevent famines and when they will fail or abstain from doing so. The best-known argument comes from Sen, who has argued throughout his work on famine that regime type is what matters for political responsiveness to famine threat and that 'there has never been a famine in a functioning multiparty democracy' (Sen 2001: 178). According to Sen, democratic leaders respond to the threat of a famine because they have to win elections and face public criticism. Since political survival of autocrats does not depend – at least not to the same extent – on mass support, autocrats are less likely to respond adequately to the threat of famine mortality. The mechanism that Sen sees at work is that in democracies the government is forced by public opinion to act: 'With a relatively free press, with periodic elections, and with active opposition parties, no government can escape severe penalty if it delays preventive measures and allows a real famine to occur.' (Sen 1990: 50)

However, Sen does not really explain why and to what extent the incentive structure for democratic governments differs from the incentive structure of autocratic regimes. His functional logic of famine prevention – democratic leaders will prevent famines because otherwise they will be severely penalized by the democratic public – is overly optimistic since it presumes that democratic governments can never find it support-maximizing to remain inactive in the face of a famine threat. As Bhagwati (1995:59) has put it: 'Sen's precise argument (…) is too simplistic and fails to persuade.' We will therefore develop a theory, which aims to explain why and under what conditions democracies and autocracies respond differently to famines and why even democracies may at times remain inactive or respond too late. Before that, however, we will discuss a famine case from India, which illustrates that some small-scale famine mortality is possible in democratic regimes and that democracies can react in rather complex ways to the threat of famine mortality. In democratic India, international food aid was instrumental in containing famine mortality, which we compare

and contrast with the failure of such aid to prevent large-scale famine mortality in autocratic North Korea.

## 3. Regime Type, International Food Aid and Famine: Evidence from India and North Korea

'India is an important case study for testing the political economy of responsiveness. It is home to a large vulnerable population (…). India is a federal democracy, and popularly elected state governments play a key role in relief activities. There is a relatively free and independent press.' (Besley and Burgess 2002: 1416). Indeed, Sen regards post-independence democratic India as a major piece of evidence in favor of his claim that no famine ever took place in a democratic country with free press. He insists that India has not suffered a major famine since 1947: 'The last major famine in India took place before independence, viz. the Bengal famine of 1943, in which about 3 million people died. Since then there have been a number of threats of severe famine (e.g. in Bihar in 1967, in Maharashtra in 1973, in West Bengal in 1979, in Gujarat in 1987), but they did not materialize, largely due to public intervention.' (Drèze and Sen 1989: 8). Sen thus argues that large-scale famine mortality has been prevented by intervention of a responsive democratic government.

Yet, on closer inspection the devil lies in the detail, with some observers arguing that some famine mortality actually did occur during the 1967 Bihar and the 1973 Maharashtra famines (Dyson and Maharatna 1992). We will concentrate here on the Bihar famine since Drèze (1990) himself in his single-authored contribution to their co-edited volumes on *The Political Economy of Hunger* is much more cautious in his verdict on famine mortality than Drèze and Sen (1989). Noting substantial drops in food production, food availability and calorie consumption, he addresses the issue of excess mortality. He regards officially published data on registered deaths as the least unreliable, particularly for assessing changes in

mortality. According to these data, there was excess mortality of 1 and 3.5 deaths per thousand people in Bihar in 1966 and 1967, respectively.[6] These unimpressively small numbers nevertheless suggest an excess mortality in the famine-ridden years of up to several ten thousand deaths (50.000-175.000), given a population at the time of roughly 50 million. Dyson and Maharatna (1992) regard the official total mortality data as highly deficient and therefore conclude that substantial excess famine mortality cannot be deducted from these data, but can also not be excluded as a possibility. They regard the registered infant mortality rate as more reliable and find that this mortality increased more in the Bihar districts most affected by the drought, which provides some indirect and tentative evidence for excess mortality. Drèze (1990: 59) comes to the conclusion that even if the official mortality data are questionable, 'one thing is clear: there is precious little evidence to support the self-congratulatory statements that have commonly been made about the Bihar famine, e.g. "no exceptional mortality was recorded" or "no one died of starvation".'

Interpreting Bihar as a case of successful famine prevention by a responsive democratic government also appears questionable in the light of the actual responses by the state and central governments. In a detailed study, Brass (1986) shows that democratic response to the Bihar famine has been far from straightforward. Instead of doing everything they can to relief the famine impact, the relevant political actors 'used the crisis to gain advantage or prevent harm in their relations with each other' (Brass 1986: 253). Initially, the central government refused to accept the severity of the crisis and to provide assistance because the state government was regarded as incompetent and out of favor, despite both being run by the Congress party. The state government itself refused to declare a state of famine before the elections in November 1967 and famine was declared only after its election defeat by a new government.

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[6] Singh (1975) reports higher mortality rates still in famine years, but Drèze (1990) notes internal inconsistencies in Singh's estimates.

Eventually, food aid was provided to Bihar. Approximately 2.5 million tons of grain were shipped to the affected regions, which was about half of the amount requested by the regional government. However, rather than the central government re-directing food from unaffected provinces to Bihar, the large bulk of the food shipped to Bihar came as international food aid from the US (Brass 1986: 259). Thus, the Bihar case not only demonstrates that some famine mortality can happen even in democracies, it also shows that democratic governments do not always act responsively and prevent famines fully. There can be little doubt that the response to the Bihar famine came too late and was insufficient to prevent famine mortality entirely. It is difficult to say whether the Indian government would have been willing to prevent a potentially much higher number of deaths in the absence of the humanitarian intervention by the US.

The Bihar famine highlights two problems of democratic response to famine: A famine becomes easily politicized, which can hinder rather than help immediate famine response as politicians get caught up in their politics rather than concentrating on famine relief, and a central government will be reluctant to redistribute domestic resources to famine victims if the affected population represents only a minority of the electorate and is not decisive for general elections. Fortunately for the famine victims in Bihar, the central Indian government could draw upon generous external assistance. This suggests that international food aid can be instrumental in overcoming the internal impasse that even a democratic government might face in confronting an impending famine threat. Thus, whilst the reaction of the Indian government to the famine in its state of Bihar was everything but straightforward, once famine was officially declared the government happily accepted very large quantities of foreign food aid and allowed staff from foreign donors and international organizations to help in administering and allocating the food aid. With the help of ‘the dedicated cooperation of the international community’ (Mayer 1974: 111) famine mortality was not prevented, but at least limited.

International food aid has not always been so successful in containing famine mortality. Contrasting the Indian experience of the Bihar famine with that of North Korea provides a case in point. Starting from the mid- to late 1990s, famine has been a persistent phenomenon in North Korea. A combination of flooding, droughts, and general agricultural mis-management led to severe food shortages during the period 1995 to 1999 and beyond (Noland, Robinson and Wang 2001; Woo-Cumings 2002). The North Korean government only reluctantly accepted the reality of famine and even more reluctantly asked for external help. Once it did, international food aid entered the country in large quantities, but from the start it was hampered by North Korean obstruction and unwillingness to allow the international relief organizations organize and monitor the distribution of food aid. Following evidence of large-scale misuse of food aid – it ended up in the hands of government officials and the military rather than in the hands of hungry civilians while whole regions deemed to be unimportant for the survival of the regime were entirely cut off from food aid – several relief organizations pulled out from North Korea in the late 1990s and 2000 (Goodkind and West 2001; Natsios 2001).

Despite severe food shortages continuing to pose a problem, the North Korean government decided to no longer accept international food aid in December 2005.[7] All private aid groups were expelled. The World Food Programme (WFP) was allowed to resume its operations half a year later in May 2006, but the new contract does not allow the WFP to open offices outside the capital Pyongyang and the operation will be much smaller in size than previous ones. Rather than feeding 6.5 million people as before 2005, the new operation is said to be down to feeding 1.9 million people.[8] At the same time, WFP will no longer have

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[7] World Food Programme press release. (www.wfp.org/english/?ModuleID=137&Key=2092). Last visited 20 January 2007.

[8] Associated Press. (www.msnbc.msn.com/id/12729278/). Last visited 20 January 2007.

control over the storage, transportation and distribution of food aid, which will be entirely in the hands of North Korean government officials.

As with any information about North Korea, reliable estimates about the number of famine deaths are hard to come by. Goodkind and West (2001) estimate between 600,000 and one million famine-related deaths over the period 1995 to 2000, with more deaths since, if on a lower scale. Other estimates put the number up to 3.5 million (Noland, Robinson and Wang 2001). Even if these are over-estimates, at a pre-famine population size of 22 million, the North Korean government spectacularly failed to prevent famine mortality on a very large scale. Admittedly, North Korea is a stark example of a dictatorship.[9] Yet, our theory, spelled out in the next section, suggests that much of North Korean governmental behavior – the diversion of international food aid to the benefit of government officials, the cutting-off of aid to civilians and entire regions deemed unimportant for regime survival, the obstruction of international relief organizations etc. – is typical for autocratic regimes because it follows their logic of political support maximization.

If governments can, but need not, avert famine mortality, then the question is: what induces governments to prevent famines from turning mortal? To provide an answer to this question, we now turn to our political theory of famine mortality.

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[9] It is also somewhat atypical in that, due to the military threat posed by North Korea, the famine took place in a politically charged environment and donor countries used food aid promises in exchange for gaining diplomatic concessions from North Korea (Noland, Robinson and Wang 2001). This does not mean that there was no generous aid. The WFP estimates that North Korea received four million tones of commodities valued at US$ 1.7 billion by the end of 2005 (www.wfp.org/country_brief/indexcountry.asp?country=408).

## 4. Inactivity or Famine Prevention? A Political Theory of Famine Mortality

In this section, we develop a political explanation of famine mortality. We start by stating the assumptions of our theory, from which implications on governmental action or inaction follow. We explain the political trade-off that all governments face in contemplating action against famine, whether democratic or autocratic, before deriving differences in the governmental response of democratic and autocratic regimes. We then discuss the role that international food aid plays in the calculus of governments before summarizing the theoretical argument and formulating testable hypotheses.

### *Assumptions*

Our theory distinguishes between the government of a country, an elite and the broader population. We assume that in the event of a severe famine threat, only a part of both the elite and the population is directly affected. While the share of the affected members of the elite can of course be substantially different from the share of the affected population, this difference is not important for our argument. More importantly, we assume that the government determines the degree to which it intervenes to assist those affected by famine and that it has two possibilities for this intervention: it can directly assist selected famine-affected individuals by targeted transfers or it can provide assistance in the form of quasi public goods, which benefit all affected individuals, not just selected ones.

We believe that these assumptions are realistic. First, famines almost never hit entire countries. Even the worst famines in history took place in more or less clearly defined regions of the countries: Ireland in the 1840s was a part of the UK, the Soviet famine of the 1930s mainly affected the Ukraine, the 1943 Bengal famine only affected parts of India, and so on. Even during the Great Chinese famine, only 12 (of 28) provinces showed *significant* excess

mortality (National Statistics Bureau China 1990).[10] Most other famines affect only a subgroup of the population either because the food shortage does not hit the entire country or – if it does – is caused by an uneven distribution rather than a lack of food.

Second, governments can typically intervene in various ways to help affected individuals escape the severe famine threat. For example, the government can buy or requisition food from domestic markets in unaffected parts of the country and re-distribute it to affected parts. The government can also open up protected domestic food markets to allow food imports. It can provide affected people with the economic means to buy food either by financial transfers or by creating temporary public employment. *Because* famines typically hit only parts of countries while others remain unaffected, there is normally enough overall food available.

Third, governments can be selective in providing assistance, but they do not need to be. Take the example of food aid, perhaps the most direct way of helping affected individuals. Governments can hand out food aid to selected individuals, thus discriminating against others, or they can provide food aid as a quasi public good by throwing it off lorries or airplanes, which – if they do not discriminate between equally affected regions – is the least selective way of providing food aid.[11]

Fourth, and perhaps most strikingly, our assumption that even members of the elite can be affected by a famine is not unrealistic either. By this, we do not mean that members of the

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[10] See Lin and Yang (2000) for an analysis of excess mortality based on this data source. See also Li and Yang (2005).

[11] Food is of course not a 'public good', but the *provision of food aid* can indeed have some public good characteristics. When governments do not target food transfers to selected recipients, but distribute food aid to the affected parts of the population without excluding recipients, then indeed food aid (but not the provided food) is not exclusive and only weakly rival (depending on the amount of food aid).

elite starve and perhaps die of hunger (they rarely do). Rather, it is plausible to assume that members of the elite own farms, factories, shops and other businesses in affected regions. Thus, the profits of the affected elite members may suffer in the event of famine.

In terms of behavioral assumptions, we assume that the government maximizes its political support to stay in power. In democracies, the survival of the government will also depend on the support from the elite, but the wider population plays a crucial role as voters in elections. In autocracies, governments first and foremost have to defend their political influence against potential rival groups from the elite. The autocratic government, in other words, has to satisfy the demands of a relatively small elite and can neglect to some extent the demands of the wider population. A total neglect would be dangerous though since the population can try to topple the elite in a revolution. However, for us it is not important that the elite is also influential in democracies and that the wider population is not entirely without influence in autocracies. Rather, what matters is that the relative influence of these two groups varies with the level of democracy. Indeed, the terms autocracy and democracy are so closely related to conceptions of the relative power of the people and the elite that this assumption is self-explanatory.

Both the people and the members of the elite maximize their individual utility. Food and income enter this utility function positively. The famine death of others lowers individual utility, either because individuals are somewhat altruistic or because they are also affected and fear that death eventually may reach them as well. Even if they are unaffected by the present famine, they may regard famine mortality as a sign of government failure, rendering them less secure in the face of future potential famine (and other) threats in which a government intervention is required. We assume a well-behaved concave utility function. Thus, for example, the marginal utility from food is strictly positive, but diminishes with larger quantities of food. For our argument it is not important whether individuals are willing to sacrifice food (or money) to save other individuals. If they do so on a large scale, hunger will

be rare and famine mortality will not occur. For the sake of argument and to be consistent with the empirical fact of excess mortality in some famines, we have to assume that in the presence of an external famine shock, a moderate level of 'altruism' or 'diffuse reciprocity' does not suffice to prevent excess mortality. In other words, preventing excess mortality typically presupposes governmental intervention.

*The Political Trade-Off of Famine Prevention*

Consider a country in which a drought or a flood leads to a regional crop failure and as a consequence to a severe famine threat. As noted above, there are multiple ways in which a government can help those affected. If doing so were costless, then all governments would act against all threats of famine mortality at all times.[12] Unfortunately, however, whichever way the government takes to help individuals affected by famine, there is always an economic cost to some others unaffected by the famine. If the government buys the food on the domestic market, food prices inevitably rise so that the consumers in the unaffected parts of the country become worse off. Confiscation and opening up protected domestic food markets hurt agricultural producers. Buying food abroad, financial transfers and creating massive temporary public employment all cost public money, which has to be financed by higher taxes or public debt. The beneficiaries of government inactivity are therefore the consumers and taxpayers in unaffected regions, which would suffer from higher food prices and/or higher taxes, or agricultural producers, which would suffer from opening protected domestic food markets. As a consequence, if the government acts to help people affected by famine, it will inevitably lose some support from either the expropriated owners of food, peasants, farmers, the land oligarchy, or the consumers and tax-payers.

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[12] Exceptions would only occur if governments used food as a weapon in a civil conflict (see below).

Rational governments, which seek and depend on political support, will therefore face the following trade-off: On the one hand, ignoring a famine that affects a certain share of the population will lead to the loss of political support of those affected plus those who care strongly about the fate of affected people without being affected themselves. On the other hand, taking action to help those affected by famine will lead to the loss of political support by some of those harmed by government action or, equivalently, by those benefiting from government inaction. A government will remain rationally inactive if famine prevention leads to more loss of support than failing to prevent famine.

Our model also extends to extreme situations in which the government's political support function is not only independent from the reaction of the affected population, but in which the government may even gain a strategic advantage from remaining inactive. If the government fights a civil war with groups from the affected region, and if the unaffected part of the population supports the government in this civil war (for example because of an ethnic, cultural or other social divide), then the incentive to help the famine-affected individuals largely diminishes. The reason is that the government cannot earn much support from that part of the affected population against which the civil war is fought, while the unaffected part of the population may even support governmental inactivity. Accordingly, depending on its location and its political context, civil wars may increase famine mortality without necessarily weakening the position of the government.[13]

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[13] The one aspect of conflict-related famines that our theory is not particularly well suited to explain is when a government not only uses an exogenous famine to its strategic advantage, but actively creates a famine by, for example, destroying agricultural plantations. To be sure, the consequence of increased famine mortality is consistent with the predictions from our theory, but our theory is neither able to nor intends to explain the governmental choice of artificially generating a

Furthermore, our theory suggests that the response of the government depends on the relative size of the affected to the total population: the larger the share of affected individuals, the higher the probability that the government intervenes. The reason is that the more affected individuals there are, the more political support the government stands to lose by remaining inactive: it loses the support of more affected people as well as support by unaffected people due to the prospect of a larger number of people dying in case of government inaction. However, the larger the share of affected individuals, the more difficult famine mortality prevention becomes since more people need to be assisted.

*Famine Prevention in Democracy and Autocracy*

The basic trade-off that governments face when contemplating acting against famine exists in both democracies and autocracies. This, however, does not mean that both regime types will respond equally to famines – quite to the contrary. We have made only one assumption that distinguishes autocratic governments from their democratic counterparts: autocratic leaders are relatively more responsive to members of the elite while democratic governments respond more to the demands of the broader population, the voters. Yet, this difference has large effects on governmental action toward famine prevention.[14]

For the sake of argument, but with no loss of generality, let us examine how (non-existing) ideal regime types respond to famine threats.[15] Assume therefore, for simplicity, that autocratic governments solely depended on support from the members of the elite. The

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famine. See Humphreys and Weinstein (2006) for a discussion of civilian abuse in civil wars and Marcus (2003) for a discussion of famine crimes in international law.

[14] Famines are too rare to analyze whether institutional differences within democracies (see, for example, Cheibub 2006) systematically influence political response.

[15] Real-world political regimes can simply be understood as a mix of the two ideal types.

government may remain inactive in the face of famine threat if the share of the elite that is affected is either very small or affected elite members cannot mount a challenge to political leadership of the government. However, the government always has an incentive to compensate famine-affected elite members by targeted and selective transfers (of food, money etc.), making individuals outside the elite shoulder the costs, as much as this is possible, in order to avoid imposing costs on unaffected elite members. Importantly, those famine-affected individuals outside the elite are left vulnerable to the mortal impact of famine, unless the disutility to elite members from the excess mortality leads to a greater loss of support than government action to prevent famine mortality among individuals outside the elite.

The democratic government responds differently. Assume, again for simplicity, that the elite does not matter at all. The democratic government may also remain inactive and allow people to die from famine if inaction is support maximizing. However, if government action is support maximizing, then the larger number of individuals with political influence in need of assistance (namely, all affected people, not just the affected members of a small elite) implies that targeted transfers become infeasible. Government action in democratic regimes is therefore more likely to take the form of policies that have quasi-public good characteristics and benefit all affected people, not just those that form part of the elite. Government action will, for example, take the form of general non-discriminatory food aid to affected regions (e.g., throwing abundant food from airplanes over affected regions), rather than the form of targeted compensation to selected elite members.

So far, we have not argued that democratic governments are more likely to respond to the threat of famines than autocratic governments. In fact, if anything democracies are more severely exposed to the political trade-off that governments face since autocracies in principle can make those outside the small elite pay the costs of government action, whereas it is typically not possible for democracies to avoid redirecting resources from politically influential individuals. However, the possibly lower likelihood of total inaction in autocracies

merely means that affected elite members are unlikely to remain uncompensated by the government. It does not imply that there will be fewer famine deaths outside the elite. Quite the opposite: our theory predicts that democracies, once they respond to famine threat, do so by providing general food aid and other quasi-public goods while the autocratic government compensates the affected members of the elite by targeted selective transfers. In other words, autocratic governments respond differently to famine crises than democratic governments. They dominantly seek to shelter the elite from the adverse consequences of food shortage. Intervention in a famine by a democratic government, on the other hand, is likely to assist all affected individuals.

*The Role of International Food Aid*

Up to this point we have ignored a potential exogenous source that can provide governments with a way to mitigate or even solve the political trade-off that governments face: international food aid. Typically provided by international donors in the form of grants, food aid from abroad channeled to famine-stricken regions will prevent loss of support by affected people (and their unaffected supporters) without immediate economic costs to others, thus preventing loss of political support to the government by unaffected people.[16] In other words,

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[16] We stress the word 'immediate', as it is of course well known by now that even 'free' international food aid often comes at a cost in the long run. For example, it can depress domestic food production and make the recipient country dependent on external donors, undermining their own national capacity and leading to dependency and demoralization (de Waal 2000; Barrett 2002). Moreover, aid in general and food aid in particular may cause moral hazard problems (Goldsmith 2001: 124ff.). As a consequence, governments invest too little in food storage. However, there are two reasons why these costs are unlikely to enter the government's calculus. First, they pertain more to the effect of continuous dependence on the provision of food aid in the form of what is typically called program and project food aid (Clay and Stokke 2000) rather than the short-term influx of emergency

food aid allows the government to win political support from the affected parts of the population and/or the elite without needing to fear a decline in support from unaffected parts. Simple arithmetic suggests that this effect of international food aid increases the probability that governments will act to significantly reduce famine mortality.

However, even if international food aid means that government inaction becomes less likely, this does not imply that governments will use international food aid responsibly and efficiently to the benefit of affected individuals. If the famine has already generated externalities, which threaten the government's popularity in regions unaffected by the famine, governments may direct parts of the additional food supply to unaffected regions. While this policy may be interpreted as misuse of international food aid, the political logic directly follows from the opportunistic model of famine prevention discussed above: if governments maximize their political support by mainly focusing on the famine's effect on the unaffected parts of the population, then there is an incentive to use food aid for fighting the political externalities of the famine rather than the famine itself.

Thus, even if the international community provides food aid, governments may still have an incentive to propel the lion's share of the available resources to recipients who do not suffer from under-supply of food.[17] This implies that food aid alone is not sufficient to ensure an

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food aid to prevent famine mortality. Second, the costs are clearly of a more long-term nature, too long indeed for most governments to worry about. In the short term, international food aid provides an easy and cheap way out of the trade-off described above.

[17] While in our case the domestic interest structure may lead to incomplete compliance of a food aid contract by the government, Dai's (2005) game-theoretical model which links international agreements to domestic enforcement mechanisms seems to be applicable to international food aid contracts as well. Yet, the assumption of diminishing marginal utility from higher food supply means that additional food for those parts of the population that have already enough to eat, does not increase support for the government by much. This ensures that international food aid actually changes the

immediate and fully responsible reaction from the government. Only if the availability of resources is accompanied by a political incentive structure that prompts governments to direct resources to the affected, will famine prevention occur on a sufficiently large scale. Thus, international donors rather distrust the government and prefer organizing the transport and the distribution of food aid themselves if the population in the affected region is of marginal importance to the government.

Autocratic governments can be expected to respond differently to the availability of international food aid than democratic governments. Since they have a lower incentive to provide food aid to the affected wider population, they may misuse food, sell it on black markets for the benefit of the elite or simply let it rot. They will regard foreign food aid and its donors with suspicion despite the relief it can bring. They are more likely to hamper and obstruct foreign aid intervention and will try to appropriate as much of the rents from food aid for the elite to the detriment of the broader affected populace. Moreover, autocratic governments are also less likely to ask for international food aid in the first place, because they can supply sufficient resources to the affected parts of the elite.[18] Democracies, on the other hand, are more likely to ask for food aid and allow the staff of foreign donors into their country, thus maximizing the chance that food aid will be fairly and efficiently allocated to all affected people instead of being diverted.

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optimization problem of the government, rather than just replicating the distribution problem at a different level.

[18] We know of no study suggesting that foreign donors systematically discriminate against autocracies in the provision of food aid in emergencies (see Lavy 1992). Importantly, our argument is that even if an autocracy receives the same amount of international food aid as a democracy, it is likely to reach fewer affected people than in the democratic state and is thus likely to save fewer lives.

*Summary and hypotheses*

In sum, we argue that both democratic and autocratic regimes face the trade-off between loss of political support for government action and loss of support for inaction toward famine. Democratic regimes are not immune from a political rationale that might induce governments to remain inactive altogether or for too long, which explains why some famine mortality can happen even in democracies.

If democracies have lower famine mortality than autocracies, then this can be explained by differences in how they respond to famine crises. Stated succinctly, autocratic regimes might maximize their support by compensating members of the elite affected by famine via targeted transfers, leaving those outside the elite unprotected from the potentially fatal impact of famine. The larger size of the group of politically influential individuals induces democratic governments to use policies that benefit all affected people, not just a small elite, and the more so the larger the share of affected people to the total population. Of course, even autocracies will have to eventually respond to an increasing share of the affected population by going beyond targeted transfers to a small elite, if only for fear of riots and rebellion that could undermine the regime. Importantly, however, their reaction will always be more targeted at the benefit of the small elite than at the benefit of all affected people.

Furthermore, both democratic *and* autocratic governments are more likely to help those affected by famine if abundant international food aid is available. Food aid and the share of affected to total population thus jointly determine the government's response to famine threats and thereby indirectly also famine mortality. The larger the share of affected people to the total population, the more likely are governments to act and the more likely are they to act using measures that benefit all affected people, not just directed targeted transfers. Governments that exclusively use international food aid to prevent famines no longer face the political trade-off of famine prevention. However, democratic governments are more likely than their counterparts in autocratic regimes to make good use of international food aid to the

benefit of all affected people. The presence of international food aid also increases the probability of famine mortality prevention in autocracies, but to a lesser extent than in democracies, because the autocratic government will direct a larger share of the international food aid to directly and indirectly affected members of the elite and a smaller share than their democratic counterparts to the directly affected general population. For any given share of affected people, higher international food aid will lower famine mortality, but more so in democracies than in autocracies. This suggests that a large ratio of affected individuals to the total population and international food aid are partly substitutes and that the combined effect is conditional on regime type. When a larger share of the population is affected by the famine and when international food aid is available, even autocratic governments will act against the threat of famine mortality, and democratic governments even more so.

Our theory of differential famine mortality in democracies and autocracies allows us to formulate three hypotheses to be subjected to an empirical test:

1. Democracies can experience famine mortality, but mortality is likely to be lower the more democratic the country.
2. Famine mortality is lower when international food aid is available and a large share of the population is affected by the famine.
3. Democracies respond more elastically to the simultaneous presence of international food aid and a large share of the population being affected. Thus, the mortality gap between democracies and autocracies increases when both the share of the affected population becomes larger and when more international food aid is available.

## 5. Research Design

In the next section we subject our theory to an empirical test. To do so, we need to explain first of all the choice of variables and the estimation technique.

*Dependent variable*

Famine mortality is notoriously difficult to estimate. To our knowledge, there are only two sources that provide estimates of mortality for all the major famines of the 20th century. One is the Emergency Disasters Data Base (EM-DAT) provided by the World Health Organization Collaborating Centre for Research on the Epidemiology of Disasters (CRED), which contains information on the occurrence and effects of more than 10,000 natural disasters since 1900. According to the CRED, the database is compiled 'from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies' (www.em-dat.net) and is maintained and continuously updated by its staff. The other source is a compilation of mortality estimates from several mostly academic sources on each individual famine put together by Devereux (2000), a well-known scholar of famines. We use EM-DAT as our main source because Devereux (2000) only lists famines with more than 1,000 people killed, whereas EM-DAT also includes famines of smaller size, and use Devereux (2000) only for the few cases in which EM-DAT refrains from providing a mortality estimate (5 out of 35 famines with positive mortality in our dataset).

EM-DAT formally distinguishes between "famines" and "droughts" since not all famines result from drought, but in EM-DAT droughts merely form a sub-set of the broader famine category. Hence we add drought and famine mortality. Our dependent variable is the number of people killed by both "famines" and "droughts" in a country-year, as reported by EM-DAT, complemented by excess famine mortality estimates reported in Devereux (2000) for

famines in which EM-DAT does not provide mortality estimates itself.[19] For simplicity, we refer to this as famine mortality. Data availability on our explanatory variables reduces the number of famines with reported fatalities further to 35. Twenty-three famines in our sample have an estimated famine mortality below 1,000 people, seven famines killed more than 1,000 but less than 100,000 people, and five famines killed 100,000 people or more (Mozambique in 1984, Sudan in 1984 and 1988, Ethiopia in 1985, Bangladesh in 1974).[20] Based upon our definition of democracy from the Polity project (see below), nine famines with positive mortality occurred in democracies with a mean mortality of about 43,000 people (st.dev. 83,000) and the largest famine in Sudan in 1988 with an estimated mortality of 250,000 people.[21] 26 cases of famine mortality took place in autocracies with a mean mortality of about 82,000 people (st. dev. 297,000) and the largest famine in Bandladesh in 1974 with an estimated mortality of 1.5 million people. No doubt, fatal famines and particularly so famines with very large fatalities are a rare event. This renders estimation more difficult, but advanced estimation methods can deal with the problem and still generate valid results, which we discuss now.

*Estimation technique*

Our dependent variable is a count variable, in which on the one hand counts above zero are rare, but on the other hand counts can be fairly large in these rare cases. This is just another

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[19] For two of the five famine mortality estimates taken from Devereux (2000), he provides a minimum and maximum estimate of excess mortality. We took the mean estimate, but we stress that our results are hardly affected if one takes the minimum or maximum estimate instead.

[20] Due to lack of data on the explanatory variables, the North Korean famine is not in our sample.

[21] See Keen (1994a) and de Waal (2000) for a detailed discussion of this famine under democratic government.

way of saying that the sample variance exceeds the sample mean – and it does so by more than a factor of 40. Accordingly, a negative binomial model is more appropriate than the Poisson model. If we were to choose a Poisson distribution to estimate this data, the observations would be over-dispersed and the estimates were likely to be biased. The negative binomial distribution has one more parameter than the Poisson. This parameter is used to adjust the variance independently of the mean. Thus, the negative binomial model avoids over-dispersion and allows unbiased estimates given the sample mean and variance represent the population mean and variance.

Yet, we do not use a standard negative binomial model but a variant of it called the zero-inflated negative binomial model. This model is a maximum likelihood estimator in which a logit (or probit) equation is used to distinguish the functional form of the zeros from the functional form of the non-zeros. To test whether a standard negative binomial model or its zero-inflated variant is more appropriate, we performed the Vuong test, which is based on a normal distribution, so that positive values above 1.7 suggest the use of the zero-inflated model, negative values below -1.7 point towards the use of the simple negative binomial and values between -1.7 and 1.7 are inconclusive. With no exception, we find that the zero-inflated model is more appropriate. However, our results remain *substantively* unchanged if we use the traditional negative binomial model instead (results of which are contained in Appendix).

*Explanatory variables*

Following our hypotheses, the main variables of interest are democracy, the number of people affected relative to total population, and international food aid. We use Freedom House data on political rights as well as the polity2 variable from the Polity project, more commonly used

in political science, as our measures of democracy.[22] Our theory suggests that democracies respond more elastically to the simultaneous presence of a large share of affected people to total population and international food aid. The number of people affected by a famine is taken from EM-DAT and is defined as 'people requiring immediate assistance during a period of emergency'. For the very few cases, in which EM-DAT does not provide an estimate, we consulted the sources listed in Devereux (2000) to establish the number of people affected. The number of people affected was divided by population data from World Bank (2004) to create the share of people affected relative to population size. International food aid in tons of cereals was taken from FAO (2004).

Given our theory, we are interested in the interaction effect between both variables and specifically whether the coefficient of this interaction effect is higher in democracies than it is in autocracies. Rather than constructing a difficult-to-interpret three-way interaction model with the continuous democracy measures, we condition the interaction effect between the population share affected by famine and international food aid on regime type dummies (democracy vs. autocracy). If our theory's predictions are correct then the coefficients of both interaction effects should be negative and statistically significantly different from zero, but the coefficient of the interaction effect in democratic regimes should be significantly larger in absolute terms than the one in autocratic regimes. In other words, democratic governments respond more elastically than autocratic governments to an increase in the share of affected people for any given level of food aid available (or, conversely, to an increase in available food aid for any given share of affected population). We reverse the political rights measure from Freedom House so that it runs from 1 to 7 and higher values mean more democracy. For the purpose of conditioning the interaction effect between food aid and the affected share of

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[22] http://www.freedomhouse.org/template.cfm?page=15&year=2006 and http://www.cidcm.umd.edu/inscr/polity/polreg.htm. Last visited 20 January 2007.

population, we call regimes with a value of 5 or above a democracy (this is consistent with Freedom House's own categorization of countries as "free"). For polity2, which runs from -10 to 10, we call a regime democratic if it has a value above 6. In both cases, slightly less than one third of countries are democratic and the two democracy dummies are correlated at r = .81.

Our theory suggested that, depending on its location and political context, the presence of a civil armed conflict can increase famine mortality since it may provide the government with a strategic incentive to remain inactive if the famine-affected individuals belong to a group in conflict with the government.[23] In addition, a civil conflict can make famine mortality prevention more difficult even if the affected individuals are not part of a group opposing the government, for example because of damaged infrastructure and the difficulties of organizing relief operations in conflict areas. To account for this, we use a measure of the intensity of civil conflict taking place in a country, relying on the Uppsala/PRIO 'Armed Conflict Database' (Gleditsch et al. 2002).[24] The variable codes conflict intensity on a scale from zero to three, depending on the number of battle deaths (minimum 25, maximum more than 1000 annual battle deaths).

Our theory developed a specific causal contingent relationship between democracy, share of the individuals affected by the famine to the total population, and international food aid on

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[23] Democracies may respond, possibly depending on further factors, differently from autocracies to the strategic incentive that a famine might offer in the context of a civil conflict. We leave this complex question to future research and therefore do not condition the effect of civil conflict here.

[24] Note that we have adjusted the original data such that the reference point for coding is whether the conflict takes place on the territory of a country. A conflict is not coded for a country participating in a conflict outside its own territory since such conflict involvement is very unlikely to contribute to famine mortality.

famine prevention and famine mortality. Such a partial model has the advantage of being more focused and typically more consistent than 'washing list' theories, which aim at explaining a phenomenon in its entirety. But partial explanations also have disadvantages. Most importantly, since they ignore some potentially important determinants of the dependent variable, they do not completely inform the choice of an estimation model. Thus, in order to test partial models, researchers need to include control variables to obtain unbiased estimates. In our case, results would be biased if we excluded variables that exert an influence on famine mortality *and* if these variables are simultaneously correlated with the variables of main interest. Our choice of control variables seeks to minimize this bias.

First, we include measures of rainfall and per capita renewable water resource availability relative to withdrawal in the inflation stage of our estimation model. The idea is that abundance of rainfall in a country renders it less likely that the country would ever experience any famine mortality at all. However, some countries can access water via rivers and lakes that are less vulnerable to lack of domestic rainfall (e.g., Egypt's access to the river Nile), which is why we additionally include the second measure, which approximates the abundance of available water resources of a country. Average yearly rainfall in millimeters is taken from the climate data set for political areas described in Mitchell, Hulme and New (2002). Data on water resources and withdrawal in cubic meters is taken from WRI (2004).[25]

Second, we include three control variables in the negative binomial stage of our estimation model that can plausibly impact the level of mortality. To start with, we include population size since countries of larger size might have higher absolute mortality numbers, all other things equal. We need to log this variable, however, because famines hardly affect

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[25] Due to lack of time-series data, this variable is purely cross-sectional. We also included additional variables such as annual changes in the available food-stock and the ratio of hot deserts to the total size of the country in the inflation stage. Again, the results proved to be robust.

entire countries. The larger a country gets, the smaller is the likelihood that the whole country is affected. To capture both facets of the geography of famines, a log-linearized population variable seems most appropriate. Second, we include population density. Getting food aid to people affected by famine is facilitated by dense populations. Third, we use per capita income in constant US$ as a proxy variable for a country's extent and quality of infrastructure and administrative capacity to deal with famines and prevent mortality. Data are taken from World Bank (2004).

## 6. Empirical Analysis

Table 1 displays our main estimation results. Model 1 reports the results for political rights as the measure of democracy, model 2 uses the Polity variable.

Table 1. Zero-inflated Negative Binomial Estimates of Famine Mortality.

| | Model 1 | Model 2 |
|---|---|---|
| political rights | -0.7681 | |
| | (0.2487) ** | |
| polity2 | | -0.1526 |
| | | (0.0751) * |
| food aid * affected/population | -0.1935 | -0.1802 |
| in democracies | (0.0495) *** | (0.0567) ** |
| food aid * affected/population | -0.0472 | -0.0437 |
| in autocracies | (0.0098) *** | (0.0100) *** |
| food aid | 0.0011 | 0.0003 |
| | (0.0015) | (0.0013) |
| affected/population | 119.58 | 114.75 |
| | (20.41) *** | (20.80) *** |
| civil wars | 1.5420 | 1.7957 |
| | (0.5064) ** | (0.5439) ** |
| per capita income | -0.0061 | -0.0065 |
| | (0.0009) *** | (0.0010) *** |
| population (logged) | 0.8945 | 0.7947 |
| | (0.3519) * | (0.4402) * |
| population density | -0.9919 | -1.1935 |
| | (0.3951) * | (0.4247) ** |
| intercept | -8.0800 | -8.4574 |
| | (5.9042) | (6.8928) |
| annual rainfall | -0.0009 | -0.0008 |
| | (0.0003) ** | (0.0003) * |
| net water availability | 0.0035 | 0.0037 |
| | (0.0032) | (0.0033) |
| intercept | 2.0144 | 1.9533 |
| | (1.5024) | (1.3754) |
| 1/lnalpha | 4.1227 | 4.2061 |
| | (1.2550) ** | (1.3754) ** |
| alpha | 61.726 | 67.094 |
| | (77.465) | (92.280) |
| -(pseudo-likelihood) | 471.35 | 473.40 |
| N obs. (≠0 / =0) | 35/2364 | 35/2269 |
| Wald chi² | 322.53 *** | 270.96 *** |
| Vuong | 2.16 * | 2.12 * |

* = p<0.1 **=p<0.01 ***=p<0.001

Huber-White robust standard errors in brackets , estimates with standard errors clustered on ID give substantively identical levels of significance

Let us briefly discuss our choice of an estimation model, before we come to the substantive results. The Vuong test, which tests the zero-inflated negative binomial model against the simple negative binomial model, is significantly different from zero and positive for all models. The inflation stage component of our model is thus analytically warranted (the Vuong

test), but we obtain very similar results if we ignore this econometric complication and estimate a simple negative binomial model (see Appendix).[26] Higher rainfall lowers the likelihood of a country ever experiencing any famine mortality (abundant renewable freshwater resources only matter in the negative binomial model).

Substantively, table 1 lends support to our hypotheses. We find that a higher level of democracy reduces famine mortality significantly. This result is robust to whether we operationalize democracy as the *political rights* (model 1) or *polity2* (model 2) continuous variables (hypothesis 1). At the same time, we also find that international food aid reduces famine mortality if the ratio of affected individuals to total population differs significantly from zero in both regime types (hypothesis 2). The larger the ratio of affected individuals to the total population, the stronger the life-saving effect of international food aid becomes. This result suggests that governments use food aid more effectively, when larger parts of the country are affected. Most importantly for our theory, the interaction effect of international food aid and the share of affected individuals is much stronger in democratic than in autocratic regimes in both models (hypothesis 3). In fact, the confidence intervals of the two interaction effects never overlap (chi-square tests reject the hypothesis of equality of coefficients at $p<0.0004$ in model 1 and $p<0.0047$ in model 2). Accordingly, governments in democratic countries are much more likely to effectively fight famine mortality if the famine affects large parts of the population and international food aid is available. To be fair, autocratic governments also respond to famines if the famine is widespread and international food aid is available, but they do so to a much lesser extent. Specifically, our results suggest that everything else being equal, democratic and autocratic governments reduce famine mortality

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[26] As concerns our main variables of interest, the only difference is that the polity2 variable becomes marginally insignificant, whereas the interaction effects remain significant and similar in relative size.

about equally if the share of the population in the autocratically ruled country affected by famine is about four times larger than the share of famine affected people in a democracy.

The coefficients of our control variables also have the expected signs. While civil wars tend to increase famine mortality, per capita income significantly reduces the number of famine deaths. More populous countries tend to have higher famine fatalities, all other things equal. Higher population density lowers famine mortality. It might seem surprising that the ratio of affected people to total population on its own is positive and significant, and that the food aid variable on its own is insignificant. However, with the interaction effects included, these variables cannot be interpreted in isolation. Instead, what matters is the total effect. Figure 1 nicely depicts the effect of increasing the level of food aid for a given share of affected people in both democratic and autocratic regimes.[27]

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[27] Note that we display a representative example of this conditional effect. In this example, the affected population is fitted at 16 percent of the total population. The functions are estimated employing the 'exponential decay' algorithm of Origin 7.0. Data points represent the values of the interaction effect that we used for computing the conditional effects. We used Stata's 'margeff.ado' written by Tamas Bartus. The values for all other variables we set to their mean levels to generate a baseline famine mortality. Results are substantively identical (but numerically different) if we start with a higher or lower level of famine mortality.

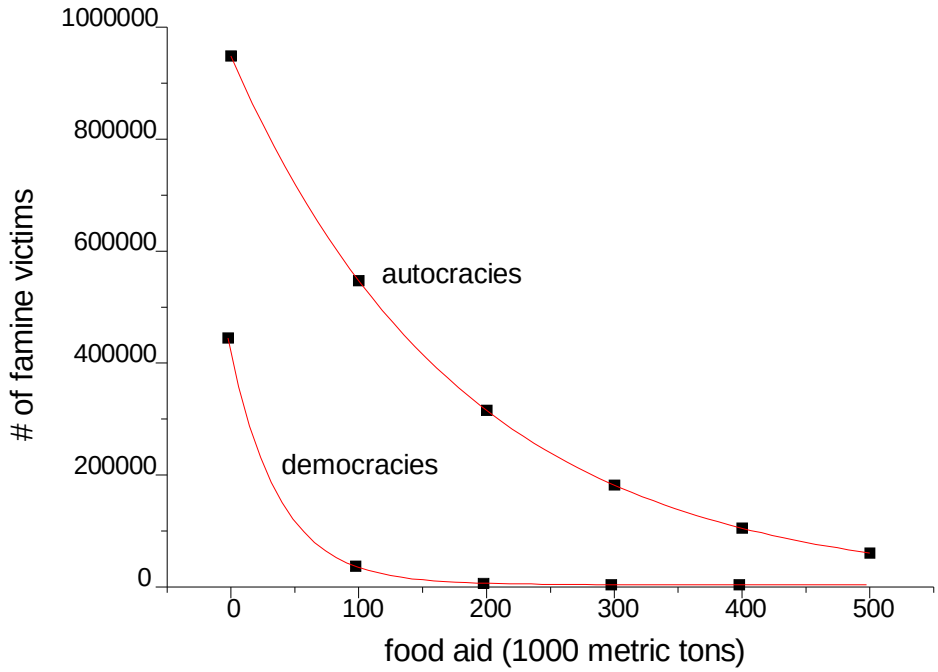


*Figure 1: The Conditional Effect of Food Aid on Famine Mortality in Democracies and Autocracies (based on a ratio of affected to total population of 16 percent)*

Observe, first, that famine mortality tends to be lower in democracies than it is in autocracies. This, of course, mirrors the negative sign of the democracy variable, but our model also predicts significant famine mortality rates in democracies when food aid is absent. While in democracies even moderate levels of food aid prevent famines from becoming mortal, autocracies need much more international food aid to prevent famine mortality altogether. Given our results, the relative difference between democracies and autocracies in famine mortality thus is highest when only a moderate amount of food aid is available.

## 7. Measurement Error

The exact extent to which famines become mortal remains typically unobserved. In most countries suffering from a famine, no government agency exists which registers the number of deaths along with the reasons that ultimately caused death. Therefore, no one actually *knows* the number of famine victims. Rather, the published numbers are *estimated* from either mortality data or from census data, which is collected many years, sometimes decades after

the famine took place. Both procedures give good estimates of famine mortality, but the information we have available is not error-free.

There can thus be no doubt that the estimation results we have reported in the previous section are based on the analysis of noisy data. It is possible that this measurement is correlated with some of the explanatory variables and therefore non-random, which would lead to biased estimations. Random measurement error would merely render estimation less efficient, but lead to asymptotically unbiased and consistent coefficients. However, the asymptotic properties of our estimates are of little relevance since we are dealing with a very rare event. While we certainly have a sufficiently large number of 'zeros' in the dataset, the number of 'nonzeros' remains fairly small. Even in the case of random measurement error, we should therefore be more interested in the finite sample properties of our model rather than in its asymptotic properties.

With 'finite sample econometrics' (Ullah 2004) still being in its infancy, the most widely used tool to explore the finite sample properties of estimators are Monte Carlo studies. We therefore conducted a Monte Carlo study, which aims at exploring the effect of measurement error on our estimates. Specifically, we re-estimated model 1 1000 times. In each re-estimation, we multiplied the value of the dependent variable of approximately 15 percent of our observations[28] by a uniform random number of the interval [0.5..1.5], which mirrors measurement errors of up to 50 percent. By drawing the measurement error from a uniform distribution, it is *on average* unlikely to be correlated with the explanatory variables. However, the actually drawn measurement error *in each iteration* may well be correlated with

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[28] To determine the 'subsample with measurement error' we drew a second continuous uniform random variable of the interval (0..1) and changed only those observations for which the randomly drawn parameter exceeded 0.85. Thus, on average, we changed the dependent variable of about 15 percent of the 'nonzeros' in each iteration of the MC.

some of the regressors even if the average correlation over infinite iterations is zero. If we were just to report the mean coefficient estimates, then the Monte Carlo study would only address unsystematic measurement error. However, by reporting the full range of coefficients from the Monte Carlo study (minimum to maximum), we take each single iteration into consideration and thus account for some systematic measurement error as well. In other words, the range of the coefficients that we report offers an appropriate measure of the importance of measurement error. Table 2 reports the summary results from this analysis.

*Table 2: Summary Statistics of the Monte Carlo Analysis testing the Importance of Measurement Error (based on model 1; 1000 iterations)*

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| political rights | -0.7665 | 0.0288 | -0.8911 | -0.6444 |
| food aid * aff/pop in democracies | -0.1932 | 0.0045 | -0.2075 | -0.1729 |
| food aid * aff/pop in autocracies | -0.0471 | 0.0010 | -0.0501 | -0.0430 |
| food aid | 0.0011 | 0.0002 | 0.0002 | 0.0021 |
| affected to total population | 119.42 | 2.11 | 109.92 | 125.28 |
| civil wars | 1.5392 | 0.0533 | 1.2650 | 1.7660 |
| per capita income | -0.0061 | 0.0001 | -0.0063 | -0.0057 |
| population (logged) | 0.8943 | 0.0265 | 0.7287 | 1.0197 |
| population density | -0.9921 | 0.0503 | -1.2420 | -0.7513 |

The Monte Carlo analysis reveals that our estimates are moderately sensitive to measurement error. The range in which the coefficients change due to the adding of measurement errors is about as large as the standard error of the estimate. Moreover, the mean of simulated coefficients is very close to the estimated coefficient reported in table 1. Clearly, this exercise reveals that the results reported in table 1 are robust to measurement error.

## 8. Conclusion

In this paper we have argued that Amartya Sen's famous claim – democracies never experience substantial famine mortality – cannot explain either the occurrence of some famine mortality in democracies nor the conditions under which even autocracies might prevent famines from turning mortal. Furthermore, our brief discussion of the famine in the Indian

state of Bihar has illustrated that the response of democratic governments can be complex and delayed as well as subject to political support-maximizing considerations. It has also highlighted the pivotal role that international food aid can play, which we compared and contrasted with the failure of such aid to prevent large-scale famine mortality in autocratic North Korea.

We have then developed a political theory of famine mortality, in which both democracies and autocracies can experience famine mortality if governments find that inaction is the support-maximizing strategy. The larger relative influence of the wider population in democracies renders it more likely that democratic governments will act with policies that benefit all affected people, whereas the larger relative influence of a small elite in autocracies favors targeted compensating transfers to the selected few, leaving the wider affected population vulnerable to the potentially fatal impact of famine. Higher levels of international food aid together with a larger share of affected people to total population means that both democracies and autocracies are more likely to act and will do more to prevent famine mortality because such aid mitigates the trade-off which support-maximizing governments face, but democracies will again use food aid more for the benefit of all affected people, whereas autocracies will use it first and foremost for the benefit of the elite.

We have subjected our theory to an empirical test of famine mortality in developing countries over the period for which we have data available (1972-2000). The results lend credence to our theory and are robust to several changes in model specification. Inevitably, a caveat is in order. We do not claim that our quantitative data analysis is conclusive or should be considered as an exhaustive test of our theory. However, we believe that we cannot get that much further with the available data and with quantitative methods. Future research must analyze in more detail how governments in different countries deal with the threat of famine mortality and act to prevent it. As yet, published evidence is rather sparse, unsystematic and

mainly focuses on the origins and consequences of famines rather than on governments' responses.

Despite this caveat, we believe that our political theory of famine mortality and the empirical evidence presented suggest two important policy conclusions. First, if governmental inaction can be a support-maximizing strategy of governments, then generous international food aid can be a necessary condition for preventing famine mortality despite abundant aggregate food resources being available in the country. This is because international food aid allows governments to respond without incurring short-term costs on the unaffected parts of the population and thus potentially losing political support. In other words, donors interested in preventing famine mortality should not necessarily shy away from offering food aid to a country experiencing famine even though the country has already abundant food available in the aggregate. Second, international donors need to deal seriously with the fact that democracies react more elastically to international food aid than autocracies for a given share of population being affected by famine. This does not mean that international food aid should necessarily go preferentially to democracies. Rather, international donors need to find ways to maximize the chances that the international food aid benefits all affected people in autocracies, not just the selected few members of the elite. This is no easy task and provides political scientists with ample opportunity to study the use of food aid in autocratic regimes and the lessons to be learnt thereof.

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**Appendix. Negative binomial estimate of famine mortality**

| | Model A1 | Model A2 |
|---|---|---|
| political rights | -0.8264 | |
| | (0.2287) *** | |
| polity2 | | -0.0889 |
| | | (0.0652) |
| food aid * affected/population | -0.1180 | -0.1189 |
| in democracies | (0.0285) *** | (0.0332) *** |
| food aid * affected/population | -0.0220 | -0.0199 |
| in autocracies | (0.0069) ** | (0.0331) ** |
| food aid | -0.0003 | -0.0004 |
| | (0.0012) | (0.0009) |
| affected/population | 72.58 | 68.19 |
| | (13.54) *** | (13.80) *** |
| civil wars | 1.4900 | 1.2764 |
| | (0.4052) *** | (0.4329) ** |
| per capita income | -0.0037 | -0.0042 |
| | (0.0004) *** | (0.0005) *** |
| population (logged) | 1.4602 | 1.3797 |
| | (0.2814) *** | (0.3042) *** |
| population density | -0.1763 | -0.4792 |
| | (0.3955) | (0.4357) |
| annual rainfall | -0.0016 | -0.0015 |
| | (0.0004) *** | (0.0004) *** |
| net water availability | -0.0156 | -0.0162 |
| | (0.0057) ** | (0.0046) *** |
| intercept | -17.8548 | -18.0573 |
| | (4.4261) *** | (4.4098) *** |
| 1/lnalpha | 5.6729 | 5.7240 |
| | (0.1793) *** | (0.1805) *** |
| alpha | 290.89 | 306.14 |
| | (52.14) *** | (55.25) *** |
| -(pseudo-likelihood) | 472.97 | 474.74 |
| N obs. | 2399 | 2304 |
| Wald chi² | 787.98 *** | 715.35 *** |

* = p<0.1 **=p<0.01 ***=p<0.001

Huber-White robust standard errors in brackets , estimates with standard errors clustered on ID give substantively identical levels of significance