DEMOCRACY, VISIBILITY AND PUBLIC GOOD PROVISION

Anandi Mani* Sharun Mukand
Williams College *Tufts University*

December 2002

*Corresponding author, Dept.of Economics, Williams College, Fernald House, Williamstown, MA 01267; email: anandi.mani@williams.edu; Tel: 413-597-3051. This paper has benefitted from the comments of participants in seminars at Boston University, Williams College, the Economic Growth Center and the Political Economy of Development Conference at Yale University, as well as from discussions with Francesco Caselli, Michael Kremer, Gib Metcalf, Stephen Morris, Dilip Mookherjee, Russ Murphy, A.K. Sen, Chris Udry, James Vreeland, Patrick Webb and especially Sumon Majumdar.

Abstract

We examine the role of *visibility* in influencing government resource allocation across a multiplicity of public goods. Outcomes are defined to be less visible in tasks if it is harder to assess government ability based on observed outcomes. Such a 'visibility effect' distorts resource allocation towards more visible goods. Our model provides an explanation for government neglect in the provision of several essential public goods, despite their considerable benefits and throws light on the puzzling phenomena of voter apathy towards such neglect. We show that greater democratization widens the gap in resource allocation between more versus less visible public goods, up to an intermediate level of democracy. Beyond this level, the gap decreases. Furthermore, public goods with low visibility are more prone to multiple equilibria in resource allocation, with outcomes being a function of voter expectations. Evidence from the global incidence of famines versus malnutrition is consistent with our analysis.

KEYWORDS: Democracy, Visibility, Public Goods, Voter Expectations, Multiple Equilibria, Government Responsiveness

JEL CLASSIFICATION: O1, H4

1 Introduction

Many developing countries are characterized by governmental neglect of basic amenities such as adequate access to health and educational services. As has been pointed out by a number of development economists, it is particularly puzzling that despite considerable benefits, the provision of essential public goods is characterized not just by governmental apathy, but more surprisingly, by voter apathy towards governmental neglect.[1] In fact, we often observe political competition and agitation on issues other than those that may yield the greatest benefits. This paper throws light on these preceding issues and asks the following questions. Why may governments be good at providing some public goods, but not others? Further, what is the impact of the extent of democratization on the nature and extent of public good provision? Our answers focus on the role that differences in the *visibility* of public good outcomes have in affecting governmental responsiveness.

Some outcomes are intrinsically less visible than others. To take a simple example, Dreze and Sen(1989) point out that the loss of life due to malnutrition is equivalent to 'three hundred Jumbo Jet crashes a day, with no survivors, and more than half the victims being children'. In contrast, the loss of life in a famine – concentrated in space and time – is certainly a more visible outcome. Failure to prevent a visible outcome such as a famine can be electorally disastrous to a government, in a way that failure to tackle malnutrition is unlikely to be. Such differences in visibility are ubiquitous – for example, it is easier to assess the quantity of a public good provided than its quality; similarly, short term outcomes are typically more visible than those that occur in the long run(Rogoff,1990). We define outcomes as being less visible if it is harder to assess government ability, given observed outcomes. Based on this definition, low visibility can arise for two sets of reasons – either if some outcomes are harder to observe or measure(as in the case of the quality of education, relative to its quantity), or if it some public good outcomes depend upon more factors outside the government's control than others.

Differences in visibility across various public goods affect their provision because of an essential aspect of governance: governments are required to provide a *multiplicity* of goods and services — from disaster relief to drinking water, from education and health to defence –

[1] As Dreze and Sen(1995), speaking of education provision in India, put it: "The empowerment of basic education is so obvious that there is something puzzling in the fact that the promotion of education has received so little attention from social and political leaders...what is perhaps most striking of all is that the failures of government policy over an extended period have provoked so little political challenge."

rather than perform a single well-defined task. Likewise, voters' assessment of a government's competence, and their voting decisions, are based on the government's performance on a *vector* of outcomes. If outcomes on some tasks are harder to observe or measure, it is harder for voters to assess a government's ability based on these tasks. Governments, being in the business of maximizing their electoral possibilities, are aware of this. Since outcomes depend both on the ability of the government and the resources allocated by it, the government has an incentive to allocate relatively more resources to high visibility public goods, so as to project high ability.

For similar reasons, economic outcomes that are 'complex', in that a large number of factors apart from government performance also affect them, are likely to be plagued by such a 'visibility effect'. The reason is that when there are a large number of factors that contribute to an overall outcome, it is difficult to isolate the role of any one factor(such as the government's ability) in determining that outcome. It is because of this that even though the economic outcomes such as the degree of literacy and health in a population may be easy to observe, their inherent complexity (in terms of a large number of complementary inputs) makes them 'less visible' and results in relatively poor government responsiveness. We capture these ideas by adapting Dewatripont et al's(1999)'s version of the career concerns model to a political economy context.

Given visibility differences, we then go on to examine the effects of greater *democratization*, through political competition, on governmental incentives. We show that greater democracy can increase the extent of distortion in the over-allocation of resources to the more visible public good – we call this the 'visibility' effect. This effect offsets the standard 'efficiency' effect whereby greater democracy also mitigates the moral hazard in government effort (See Ferejohn(1986)). Even though the overall effect of greater democracy depends on the relative importance of the 'visibility' and 'efficiency' effects, we show that it always results in a decrease in the *relative* amount of resources allocated to the less visible public good.

Our preceding analysis throws light on how differences in the extent of democracy may affect the provision of less versus more visible public goods across countries. However, such an explanation does not address the fact that there exist large differences in public good provision even for countries at very similar levels of democracy and development. For example, the relative success of Sri Lanka in terms of social sector outcomes (such as literacy and infant mortality) stands in sharp contrast to the abysmal performance of its neighbors in South

Asia, such as Bangladesh and India (see Anand and Kanbur, 1989). Similarly, even within India, there is wide disparity in state wise performance in the provision of certain public goods (Dreze and Gazdar, (1996)).[2] In a simple extension of our benchmark model, we show that public goods with lower visibility are particularly prone to multiple equilibria in resource allocation. As suggested by Hoff(2000), there can be political failure which results in some economies getting stuck at low levels of provision of some public goods.

Furthermore, we show that the relationship between the degree of democracy and the resource allocation gap between the more and less visible public goods can be non-monotonic: the distortionary gap due to the 'visibility effect' can increase with greater democracy, up to some *intermediate* level of democracy, but beyond this level, the gap narrows. This result is consistent with the fact that lower visibility goods such as health or education do not suffer from neglect in highly democratic countries. For developing countries, the multiplicity of equilibria here suggests that changing voter expectations through greater political activism and media awareness campaigns can help improve provision of low visibility goods.

Understanding the factors that affect government responsiveness is one of the critical issues in the political economy of underdevelopment,and has been addressed by a few recent papers. Besley and Burgess (2002) empirically analyze the role of a free news media in promoting political competition and thereby increasing government responsiveness in providing public goods. In contrast, our focus centers on the intrinsic visibility differences across public goods themselves. Political competition does increase government responsiveness – but more for some public goods than others. A second strand in this literature examines the importance of heterogeneity of preferences in influencing government responsiveness. While acknowledging the importance of heterogeneity (and inequality) in influencing government decisions, we deliberately abstract away this important issue, in order to delineate the impact of differences in visibility of public goods in a transparent manner.[3] However, in an extension we examine the implications of heterogeneity and observe that the distortions in governmental resource allocation caused by differences in visibility do remain. A third strand of the literature on government responsiveness focuses, in contrast to the non-lobbying framework used here, on

[2]As Dreze and Gazdar(1996) forcefully argue "It may be argued that state apathy in the field of social policy is an all-India phenomenon, and there is nothing special about Uttar Pradesh in this respect. This is not accurate. Many other states, in fact, have a much better record..."

[3]This primarily empirical literature includes Betancourt and Gleason(2001), Chattopadhyaya and Duflo(2001) and Foster and Rosenzweig(2001). Our analysis suggests that by ignoring the differences in visibility across public goods, these papers could be missing out an important aspect of public good provision.

the role of coalitions and their effectivness in lobbying for scarce public resources. The most influential work here is by Bardhan(1984).[4]

Finally, we illustrate the visibility effects described above, by examining public good outcomes across countries with differing levels of democracy. For this purpose, we pick famine and malnutrition outcomes as our candidates, given that the differences between these two, fits the two aspects of our definition of visibility well. First, famines, with their sudden and substantial loss of life are far easier to observe than malnutrition, which is more insidious in occurrence. Second, malnutrition incidence depends upon several factors all of which the present government need not bear sole responsibility for (such as mother's education, personal hygiene, weather shocks etc.). This makes it harder to hold the government alone responsible for its occurrence, unlike in the case of a failure in famine relief provision. We examine evidence on global famine occurrence and the incidence of malnutrition. Consistent with our theory, we find that while democracies, relative to non-democracies, are dramatically successful in tackling/preventing famines, their record on nutrition outcomes is quite indifferent.

Section II gives an outline of the benchmark model and then proceeds to examine the impact of democratization on public good provision. In Section III, we extend the benchmark model to show the existence of multiple equilibria in public good provision especially for low visibility goods, and demonstrate the non-monotonic relationship between democracy and the gap in resource allocation. In section IV, we discuss two additional considerations, voter heterogeneity and press freedom. Section V presents suggestive cross country evidence on malnutrition and famines in support of our theoretical analysis.

2 The Benchmark Model

We develop a stylized political economy model of resource allocation across sectors that is based on the career concerns framework.[5] The key elements of our model are as spelt out

[4]Baland and Kotwal(1997), Banerjee and Somanathan(2001) are additional papers that address the issue of government responsiveness in this tradition.

[5]The pioneering work on career concerns is Holmstrom(1982,1999). However, in what follows, we draw on the Dewatripont, Jewitt and Tirole's(1999a,b) particular formulation of the career concerns model. Dewatripont et al(1999b) explore a multi-task version of performance in bureaucracies; their analysis is not about electoral outcomes. More importantly, their analysis largely abstracts away from the issue that is of central interest to us – namely differences in the visibility and its impact on the allocation of effort *across* tasks. In

below.

2.1 Production of Public Goods

An incumbent government is responsible for the provision of multiple public goods and services, such as education, roads, defence etc. to the electorate. The output for any particular public goods is a stochastic function of the government's competence, the resources it allocates to the good and some other exogenous factors. For instance, the quality and quantity of public education provision would be a function not only of the government resources devoted to such education and its competence in designing a good curriculum, but also other factors beyond the government's control, such as the competence of teachers, parents' involvement with their children's education etc.. To capture these elements, we consider two public goods, A and B, where the production function for good $j, j = \{a, b\}$ is:

$$y_{jt} = \tau + e_{jt} + \Sigma_{i=1}^{n_j} \theta_i \tag{1}$$

Here τ is the government's ability or talent, e_j the resources/effort it allocates to task j and θ_i the quality of other exogenous associated inputs i, of which there are n_j in number. There is a cost associated with providing resources to both goods, captured by the function $C(e_a, e_b)$ which is assumed to be symmetric in both its arguments, and twice continuously differentiable. Note that while the levels of resource allocation, $\mathbf{e} = \{e_a, e_b\}$ are choice variables for the government, the associated inputs denoted by θ_i are not. Each such associated factor input θ_i is hence taken to be a random variable, $\theta_i \sim N(0, \sigma_\theta^2)$. Without loss of generality, we assume that the technology of producing public good A requires fewer associated inputs than good B, i.e. $n_a \leq n_b$. In other words, task B is more 'complex' than task A in that many more factors outside the government's control affect its outcome. In our earlier example about the quality and quantity of education, the government has greater control over determining the quantity of education, than the actual quality provided, since other factors such as parents' and teachers' attitudes affect quality more than the quantity (i.e. number of schools).

---

contrast their focus is on the level of *overall* effort put in by an agent.

2.2 Information Structure and Preferences

Governance is a multi-faceted task which requires a unique blend of skills, so that it is ex-ante difficult to reliably determine how effectively a particular government will perform. With this in mind, we adopt the career-concerns model assumption that the true ability of the incumbent government τ is not known to anyone, including the government itself. However, both the government and the citizens/voters share a common prior that its talent is drawn from a normal distribution with mean $\bar{\tau}$ and variance σ_τ^2.

Voter information and preferences:

Citizen-voters derive utility from public goods. In expected terms, a more competent government will provide better public good outcomes, hence voters care about the government's competence in making politician choices. Although the government's true competence level is not known initially, the voters can update their prior estimate $\bar{\tau}$ through the public good outcomes that they observe. In order to focus on the impact of imperfect visibility, we assume a representative voter framework.[6] This voter does not observe all public good outcomes with the same accuracy — some observations are noisier than others. For instance, while he can observe both the quality and quantity of education being provided, the quality of education is harder to assess than the quantity. To capture this, we represent the voter's observation of the outcome j as $z_j = y_j + \epsilon_j$, where ϵ_j represents a noise term, $\epsilon_j \sim N(0, \sigma_j^2)$. Without loss of generality, we assume that there is more noise in the observed outcome for good B than for good A, i.e. $\sigma_a^2 < \sigma_b^2$. The utility the voter derives from public goods provided to him determines national welfare, i.e. $W_{vt} = \alpha z_{at} + (1-\alpha) z_{bt}$, where $\alpha \in [0,1]$ is the weight attached to good A.

Government preferences:

The government's preferences are straightforward — it cares about both national welfare W as well and 'ego rents' R from remaining in office. Typically, the more democratic a country is, the more sensitive is the government's ability to stay in power to citizens' perception of its competence. Our focus here is on this political competition aspect of greater democracy, and we capture this in a parsimonious way.[7] We define democracy $D \in [0,1]$ as the likelihood that elections are held at the end of period 1. Here, the election is really a catch-all term to

[6] In Section 5, we outline the implications of relaxing this assumption when we allow for voter heterogeneity.

[7] We discuss the implications of other aspects of democracy, such as civil liberties and media freedom in section V.

represent the degree to which the incumbent's ability to retain power in period 2 depends on the citizen's perception of its competence. A greater likelihood of elections (higher D) implies that the government will have to put in effort to maximize its reputation for competence among citizens, so that it may retain power. With no elections, (probability $(1-D)$), it remains in power, irrespective of such reputation, and enjoys doing so. We can thus express its two-period preference structure as follows:

$$W_g = \lambda \sum_{t=1}^{2} \delta^{t-1} W_{vt} + [R + \delta(R(1-D) + RD.\psi] - C(e_{at}, e_{bt}) \tag{2}$$

Here $\lambda \in [0,1]$ is the weight the incumbent government places on voter welfare. The probability of re-election is denoted by ψ, which we assume to be a linear function of the government's reputation for competence with the public.[8] $C(.)$ is the government's cost/disutility of supplying resources and effort, $C' > 0, C'' > 0$ and δ is the discount factor.

Timing:

The timing of the game is as follows. The incumbent observes D and then chooses to expend a vector $\mathbf{e}$ of resources across the two public goods. Thereafter, with probability D, elections take place. Then the voter, who (like the incumbent) does not know the ability of the government, observes a noisy signal of the public good outcomes $\mathbf{z}$ and arrives at a posterior estimate of the government's competence. Elections are held at the end of period one. The newly elected (or re-elected) government determines public good output in the second period. At the end of this second period, public good outcomes are realized once again and payoffs are determined.

2.3 Equilibrium Analysis

We start our analysis of the equilibrium of this game backwards, by first examining decision making in the second period.

[8] The incumbent government's reputation represents the citizen's updated assessment of its competence, at the end of period 1. As spelt out in the analysis of the second period below, the government that cares only about retaining power has no incentive to put in effort in period 2. Hence second period public good outcomes would depend upon the government's competence alone. It is because of this fact that citizens, in making their re-election decision, care a lot about the incumbent's competence τ. We have captured this in a parsimonious manner by making the incumbent's re-election chances a *linear* function of its reputation for competence. An explicit voting game framework could be developed to deliver such an outcome, but this would add considerable complexity, without adding much insight.

Period 2

Since the game ends with period 1, the government has no electoral concerns, and so its equilibrium behavior is straightforward, . Its optimal resource allocation vector $\mathbf{e}^*$ depends solely by the weight it attaches to national welfare(i.e. λ). Therefore, its objective function expressed in equation(2) for the second period is reduced to:

$$\max_{e_{a2},e_{b2}} \lambda(\alpha z_{a2} + (1-\alpha)z_{b2}) - C(e_{a2}, e_{b2}) \tag{3}$$

The voter's perceived welfare in the second period then, is given by, $W_{v2} = \alpha z^*_{a2} + (1-\alpha)z^*_{b2} = \alpha\left[\tau + e^*_{a2}\right] + (1-\alpha)\left[\tau + e^*_{b2}\right]$, where e^*_{a2} and e^*_{b2} are obtained by maximizing (3). The key thing to note here is that in this last period, the less the government cares about national welfare (i.e. smaller λ), the more the voter's welfare is a function of the government's ability. Indeed, in the special case where the government does not care about the welfare of its citizen at all (i.e. $\lambda = 0$), the second period public good output is entirely a function of the government's competence τ (and the exogenous associated inputs). It is because of this that the citizen-voter, in making his decision of whether to retain or throw out the incumbent, cares about the government's ability. Given this, we set $\lambda = 0$ henceforth to simplify our exposition. We now turn to the equilibrium analysis for the first period.

Period 1

The government's policy choices in the first period are driven by the fact that it wants to maximize its reputation with the citizen-voter, so that it may retain power in period 2. Here, observe from the public good production function in equation(1) that resources e_j are a substitute for ability τ. This implies that the government can increase output for either public good by allocating more resources, and hence favorably skew the voter's perception of its competence.

Of course, neither the resource allocation $\mathbf{e}$ nor the ability τ of the government are directly observable. Further, the voter observes the public good outcomes with noise. At this point, we need to see how he will arrive at his ex-post assessment of τ. For this, we make use of the fact that all our random variables are normally distributed. This considerably eases computation, since not only is the posterior normally distributed, but the following property of Bayesian updating yields a relatively tractable expression too(derived in the Appendix): in particular, if $z = \tau + \Sigma_{i=1}^{n}\theta_i + \epsilon$ where $\tau \sim N(\bar{\tau}, \sigma^2_\tau), \theta_i \sim N(0, \sigma^2_\theta)$ and $\epsilon \sim N(0, \sigma^2_\epsilon)$, then the distribution of τ, conditional on observing z is also normal with mean $\frac{h_\tau \bar{\tau} + h_{\epsilon\theta} z}{h_\tau + h_{\epsilon\theta}}$ and

variance $\frac{1}{h_\tau + h_{\epsilon\theta}}$, where $h_\tau = \frac{1}{\sigma_\tau^2}$ and $h_{\epsilon\theta} = \frac{1}{\sigma_\epsilon^2 + n\sigma_\theta^2}$ are the precisions of the two distributions. Using this insight, let us see how the voter would update his prior about the government's ability if he expects the government to choose a resource vector $\mathbf{e}^* = \{e_a^*, e_b^*\}$, and observes an outcome vector $\mathbf{z} = \{z_a, z_b\}$. From equation(1), the voter uses each outcome z_j to update his prior of the government's expected ability from $\bar{\tau}$ to $(z_j - e_j^*)$, with its associated variance $(\sigma_j^2 + n_j\sigma_\theta^2)$. Therefore, his mean posterior assessment of the government's ability would be

$$E(\tau|\mathbf{z}, \mathbf{e}^*) = [\frac{h_\tau.\bar{\tau} + h_{a\theta}(z_a - e_a^*) + h_{b\theta}(z_b - e_b^*)}{h_\tau + h_{a\theta} + h_{b\theta}}] \tag{4}$$

where the terms $h_\tau = \frac{1}{\sigma_\tau^2}$ and $h_{j\theta} = \frac{1}{\sigma_\epsilon^2 + n_j\sigma_\theta^2}, j = \{a, b\}$.[9] These terms are the precisions of the different pieces of information, and hence they are used as weights on the prior and the two realizations respectively.

We analyze a rational expectations equilibrium, so that the voters' expectations of the government's effort levels are realized in equilibrium.[10] For the rest of the paper, we focus on period 1 alone, hence time subscripts are suppressed from now on. All effort levels e_j for task j refer to effort in period one. As seen from equation(4), the citizen's ex-post assessment of the incumbent's ability is rising in z_a and z_b. The government is aware of how the citizen updates, when he sees a *particular* outcome vector $\mathbf{z}$. Hence it chooses its optimal effort levels for the two tasks, so as to maximize the *expected* ex-post assessment of its ability τ by the voter, over the entire *distribution* of possible outcomes $\mathbf{z}$. The government will therefore maximize $E[E(\tau|\mathbf{z}, \mathbf{e}^*)]$ (net of its effort cost), where the first expectation is with respect to public good output $\mathbf{z}$ and the second expectation is with respect to ability of the government τ(the latter as expressed in 4 above). The government's objective function for period 1, originally introduced in equation (2), can hence be rewritten as[11]

$$\max_{e_a, e_b}[R(1 - D) + R.D[E_z[E(\tau|\mathbf{z}, \mathbf{e}^*)]] - C(e_a, e_b) \tag{5}$$

[9] See Appendix for details.

[10] The government expends resources to influence public opinion, but the net effect in equilibrium, is zero. This can be seen from the fact that, given the voter's expected effort level e_j^* for task j, and an actual effort level e_j expended by the government, the voter's ex-post assessment of expected value of τ would be $(\tau + e_j - e_j^*)$. Since $e_j = e_j^*$ in a rational expectations *equilibrium*, the government is not successful in influencing the voter's assessment.

[11] We focus on the piece of equation (2) that pertains to period 1 alone. Recall that λ has been now set to zero here. Further, since ψ is a linear function of reputation, we put it into the objective function directly.

Using equation(4), we can express

$$E[E(\tau|\mathbf{z},\mathbf{e}^*)] = [\frac{h_\tau.\bar{\tau} + h_{a\theta}(\bar{\tau} + e_a - e_a^*) + h_{b\theta}(\bar{\tau} + e_b - e_b^*)}{h_\tau + h_{a\theta} + h_{b\theta}}] \tag{6}$$

Assuming an interior solution, we can then maximize equation (5) with respect to e_a and e_b for period one, which gives rise to,

$$F_a(e_a, e_b; \sigma_a, \sigma_b, D) \equiv \delta RD \frac{h_{a\theta}}{(h_\tau + h_{a\theta} + h_{b\theta})} - \partial C(e_a, e_b)/\partial e_a = 0 \tag{7}$$

Similarly, the equivalent expression for the first order condition with respect to e_b is,

$$F_b(e_a, e_b; \sigma_a, \sigma_b, D) \equiv \delta RD \frac{h_{b\theta}}{(h_\tau + h_{a\theta} + h_{b\theta})} - \partial C(e_a, e_b)/\partial e_b = 0. \tag{8}$$

The left hand sides of (7) and (8) are increasing in $h_{j\theta}, j = \{a, b\}$, where we know $h_{j\theta} = \frac{1}{\sigma_\epsilon^2 + n_j \sigma_\theta^2}$. This implies that the marginal benefit of effort in tasks A and B are decreasing in σ_a^2, n_a and σ_b^2, n_b respectively. The above conditions tell us why a smaller resource allocation to the task with low visibility — either due to greater noise in observed outcomes, or due to a larger number of associated factors that affect outcomes — is an equilibrium.[12] If the voter finds public good A 'more visible' than public good B, then the government will, on the margin, have an incentive to allocate more resources to making available good A rather than good B, provided the two public goods compete for the same set of resources (i.e. they are substitutes — $F_{ab} > 0$). This arises because the voter, in assessing the government's competence, (correctly) puts a larger weight on the outcome of public good A than that of good B, since the outcome for good A z_a is less noisy than that for task B, z_b. The government hence responds accordingly, allocating more resources towards the visible public good A. Proposition 1 summarizes this result.

PROPOSITION 1 *Given $F_{ab} > 0$, $\forall \alpha \in [0, 1]$, resource allocation to good j is decreasing in σ_j and increasing in σ_k where $j \neq k$ and $j, k = \{a, b\}$. In particular, the government allocates a larger share of total resources to public good A rather than public good B, i.e. $e_a^* > e_b^*$ if*
(i) $\sigma_a < \sigma_b$ and $n_a \leq n_b$, or
(ii) $\sigma_a \leq \sigma_b$, but $n_a < n_b$.

[12] See Appendix for the derivation of equations (7) and (8).

PROOF: See Appendix . □

The above proposition makes a simple, though important point – governments with electoral concerns have an incentive to bias resource allocation in favor of the more visible public good.[13] This proposition offers two insights that speak to our original puzzle.

First, visibility need not be construed only in the literal sense of outcomes being innately less or more *observable* to voters. Consider the case of underprovision in important social sectors such as health or education, where outcomes are in fact observable. Part (ii) of Proposition 1 observes that in the case of public goods where several associated factors/inputs affect the final outcome, it is harder to isolate the role of the government's competence in determining the outcome. In this sense, public goods with a larger number of associated inputs, n_j are less visible, whatever be their importance for overall welfare. In the case of education, literacy outcomes and access to schooling are not just functions of central government resource provision, but also a host of other factors – be it the quality of the bureaucracy, the nature of teachers unions or attitudes of the community and parents to children's education. Given many factors outside the government's control that affect outcomes, it is hard to disentangle the precise effect of the government's competence on the final outcome.[14] Hence, voters are unlikely to place the blame for bad outcomes entirely on the government – just as they are unlikely to credit the government entirely for good outcomes. This is what reduces the government's incentive to put in effort into 'complex' tasks such as education where the outcome depends on several factors.[15]

The second insight proposition 1 offers is that the *political salience* of a public good is not necessarily determined by its contribution to national welfare (α does not matter).

[13]This result is in the spirit of Holmstrom and Milgrom's(1991) classic insight in the context of *explicit* contracts, applied to a political arena. However, an important point to note here is with respect to their offered *solution*. They suggest that the principal should optimally respond to this inefficiency by giving low powered incentives to bureaucrats, but this insight does not naturally transfer to our context. This is because, in the electoral context where the winner does take all, (the implicit) incentives are inevitably high powered. Thus, the problem pointed by Holmstrom-Milgrom is more acute in our political context.

[14]Recall that θ_i is a random variable, so it is not constant from one period to the next.

[15]The above argument shows the connection between 'visibility' and the argument for decentralization of public good provision. This is true if the provision of a public good is a function of inputs at both the Federal and State level. Decentralization of public good provision by making the state government solely responsible might improve effort expended by the state government. Of course as Bardhan and Mookherjee (1999) have pointed out, decentralization of public good provision might suffer from other problems, such as capture by local vested interests. This is a separate issue beyond the focus of our present analysis.

Rather what is crucial is the public good's visibility – which determines the extent to which a government's performance in providing that good affects the voter's decision to elect or reject it.[16] Hence, some public goods that matter a lot for national welfare may suffer from chronic government neglect, because of being less politically visible.

The above discussion has highlighted the importance of the visibility of a public good – based either on the observability of its outcome, or on the link between outcome and government's competence – in understanding governmental incentives for public good provision. We now consider how the nature of the political regime may affect the politics of visibility in public good provision.

2.4 Democracy and Public Good Provision

In this section we analyze the impact of democratization on governmental incentives for allocating resources across various public goods. In the interest of parsimony, we shall henceforth suppress the associated inputs θ_i in the production function. The role of these inputs was simply to highlight a specific, but important aspect of visibility, viz. the complexity of tasks, as discussed in Proposition 1. From now on, we consider output to be a function of the government's competence and effort, i.e. $y = \tau + e$.[17]

Democratization increases both political competition and the transparency of the governance process. Increased political competition mitigates the problem of moral hazard (Ferejohn(1986)) and adverse selection(Rogoff(1990)). While these positive incentive effects emphasized in the theory are very plausible, the empirical evidence regarding the effects of greater democracy on various indicators of development is more mixed.[18] Therefore, we take a closer look at the impact of greater political competition. Our focus is on how greater democracy, through a rise in political competition, affects a government's incentives to channelize resources *across* public goods of varying visibility.[19].

[16]This term 'political salience' is borrowed from Besley and Coate(2000) who analyze the importance of this factor in giving rise to non-majoritarian outcomes.

[17]For this altered production function, the modified expression for $[E(E(\tau|\mathbf{z}, \mathbf{e}^*)$ in (4) is $[\frac{h_\tau.\bar{\tau}+h_a(\bar{\tau}+e_a-e_a^*)+h_b(\bar{\tau}+e_b-e_b^*)}{h_\tau+h_a+h_b}]$ where the weights would change to $h_a = 1/\sigma_a^2$ and $h_b = 1/\sigma_b^2$.

[18]For instance, one such indicator is the growth rate of per capita income. A survey of work on this issue by Przeworski and Limongi(1993) concludes that the evidence does not suggest that more democracy necessarily leads to faster growth.

[19]The other important aspect of democracy, transparency, is examined in section V, through an analysis of greater press freedom (an instrument for transparency)

Unlike in the two papers cited above, greater political competition under a more democratic regime has *two* distinct effects on governmental incentives in our framework,. First, the threat of losing power has a positive incentive effect and spurs the government to greater overall effor. This is the standard benefit that arises when elections mitigatea moral hazard on the part of the incumbent(Ferejohn(1986)). We call this the *'efficiency effect'* of greater democracy. However, with multiple public goods there is a second less desirable incentive effect — the need to enhance reputation with voters induces the government's incentive to inefficiently skew resources to the more visible public goods, away from the less visible goods. We call this the *'visibility effect'* of elections. What then is the net effect of greater democratization on governmental incentives to mobilize and allocate resources across competing public goods? We address this question in the following proposition.

PROPOSITION **2** *An increase in D results in:*
(i) an increase in the aggregate effort allocated towards public good provision and
(ii) a rise in the gap in resource allocation between the more visible and the less visible public good, provided the two tasks are substitutes (i.e. $F_{ab} > 0$*) and the costs of production are not 'too convex' (i.e.* $\frac{|C_{ab}+C_{aa}|}{|C_{ab}+C_{bb}|} < \frac{\sigma_b^2}{\sigma_a^2}$*).*

PROOF: See Appendix.□

Based on Proposition II, the combination of the efficiency effect and the visibility effect gives rise to three possibilities, with regard to the level of resources allocated to the individual public goods, even as overall resource allocation increases.

In particular, increased democratization can result in one of the following possibilities. First, an increase in level of resource allocation (and hence a better expected outcome) for the more visible public good that comes at the cost of lower resources and worse outcomes, on average, for the less visible public good. This happens if the 'visibility effect' is large relative to the 'efficiency' effect. Both the level and the share of total resources allocated to the less visible public good, goes down. A second possibility is that there is an increase in the absolute level of resources allocated to the more visible good, with no change in the level of resources allocated to the less visible good. Finally, the third possibility is that there is an increase in the absolute amount of resources devoted to both public goods, but with a smaller increase in the resources devoted to the less visible good. This happens if, with greater democracy, the 'efficiency effect' is sufficiently larger that the'visibility effect'.

What is noteworthy here is that, irrespective of the relative magnitude of the 'visibility' and 'efficiency' effects outlined above, an *initial increase* in democracy results in *a rise in the gap in resource allocation* between the less and more visible public goods. This is confirmed in condition (ii) in Proposition II states that this gap rises when (a) the two public goods are substitutes, i.e. $F_{ab} > 0$ and (b) as long as the cost curve is not 'too convex'. This latter condition is more likely to hold at low levels of democracy, where overall effort will be lower.

Thus, unlike in the theoretical literature cited earlier, our analysis shows that every increase in the extent of democracy need not always imply a uniform improvement – in this case, in the provision of all public goods. The best case outcome involves an increase in resources allocated to the less visible good, albeit a smaller one than that for the more visible good. In the worst case, there is an absolute decline in resources allocated to it.

We now examine how these effects of democracy on public good provision under a more general production function, yielding both similar as well as additional insights on the impact of visibility.

3 Do Voter Expectations Matter?

Our analysis so far has shown that low visibility public goods, such as health, sanitation or the quality of education may receive relatively scant attention, particularly in democracies. But it is hard to believe that such relative neglect of low visibility public goods would be true in highly democratic countries. Also, we must readily admit that there is wide variation even in the experience of countries at similar levels of democracy, or even across regions within countries, with respect to such public good provision. For instance, the state of Kerala in India boasts rates of literacy and child mortality that are far superior to those in other wealthier parts of the country, at levels comparable to those in the developed world. Neighboring Sri Lanka, with a level of democracy and development comparable to that in India, has done a distinctly better job in the provision of education, health and other social welfare services. These issues are of pivotal importance in Sri Lanka's elections.[20]

To address these concerns, we turn to a more general production function that introduces complementarity between talent and effort where output of public good j is given by $y_j = \tau(\mu_j e_j + k_j) + e$ (instead of the additively separable function in talent and effort used

[20]See Anand and Kanbur(1989) on this.

earlier.)[21] We find that allowing for complementarity between talent and effort in the production function yields some interesting additional insights, while preserving the basic result presented in the earlier section.

As before, the voter updates his assessment of the government's competence, based on the observed outcomes. Given that we use a multiplicative production function here,

$$E(\tau|z_a, z_b, e_a^*, e_b^*) = \frac{1}{[h_\tau + h'_a + h'_b]}[h_\tau.\bar{\tau} + \frac{h'_a((z_a - e_a^*))}{(\mu_a e_a^* + k_a))} + \frac{h'_b((z_b - e_b^*))}{(\mu_b e_b^* + k))}] \tag{9}$$

where the weights h_τ, h'_a and h'_b represent the inverse of the variances for τ, $\frac{(z_a - e_a^*)}{(\mu_a e_a^* + k_a)}$ and $\frac{(z_b - e_b^*)}{(\mu_b e_b^* + k)}$ respectively.[22]

As before, the government's objective function is to maximize $E[E(\tau|z_a, z_b, e_a^*, e_b^*)] - C(e_a, e_b)$. For task j (given task $i \neq j$), the optimal effort level under this modified production function is given by the solution to:[23]

$$\bar{\tau}D.\frac{(\mu_j e_j^* + k_j)(\bar{\tau}\mu_j + 1)}{(\mu_j e_j^* + k_j)^2 + \frac{\sigma_j^2}{\sigma_\tau^2} + (\mu_i e_i^* + k_i)^2 \frac{\sigma_j^2}{\sigma_i^2}} = C_j(e_i, e_j) \tag{10}$$

To keep things as close to the original model, we will assume that $\mu_a = 0, k_a = 1$, so that the production function for A reduces to the additive form used before. For task B, we will assume that $\mu_b = 1, k_b = k > 0$, so that the production function for B is of the form $y_b = \tau(e_b + k) + e_b$, multiplicative in talent and effort.

With these parameter values, equation (10) for the optimal effort for A reduces to $F_a = 0$, i.e.:

$$\bar{\tau}D.\frac{1}{1 + \frac{\sigma_a^2}{\sigma_\tau^2} + (e_b^* + k_b)^2 \frac{\sigma_a^2}{\sigma_b^2}} = C_a(e_a, e_b) \tag{11}$$

Similarly, for task B, the corresponding expression works out to be $F_b = 0$, i.e.:

[21] This production function was introduced by Dewatripont et al(1999a,b) who also highlight the potential for multiplicity of equilibria. However, their analysis is restricted to visibility problems in the *single* task case or with respect to *aggregate* output. Since we focus on varying visibility across *multiple* tasks, their analysis is not directly transferrable to our case.

[22] This expression is the equivalent of equation(4) in the additively separable production function, with θ_i dropped.

[23] Here $\lambda = 0, \delta = 1$, for simplicity. See Appendix for further details.

$$\bar{\tau} D \frac{(e_b^* + k)(\bar{\tau} + 1)}{\frac{\sigma_b^2}{\sigma_a^2} + \frac{\sigma_b^2}{\sigma_\tau^2} + (e_b^* + k)^2} = C_b(e_a, e_b) \tag{12}$$

The expressions on the left-hand sides of equation(11) and (12) are the marginal benefit from effort for tasks A and B respectively. For task A, the marginal benefit is linear in e_a, as before. Note that, in task B, with complementarity between effort and ability, the marginal benefit varies with the effort level.

Insert Figures I(a) and (b) here

As seen in Figures I(a) and (b) the number of equilibrium effort levels depend upon the shape of the marginal benefit (MB)curve of each public good. For task A the MB curve is a straight line. For task B, the slope of the MB curve is:

$$\frac{D(\bar{\tau} + 1)(e_b^* + k)^2}{\sigma_a^2 \sigma_\tau^2 (\frac{\sigma_b^2}{\sigma_a^2} + \frac{\sigma_b^2}{\sigma_\tau^2} + (e_b^* + k)^2)^2} \left[\frac{\sigma_b^2}{(e_b^* + k)^2} (\frac{1}{\sigma_\tau^2} + \frac{1}{\sigma_a^2}) - 1 \right] \tag{13}$$

If σ_b^2 were small, the numerator in (10) would be negative for all e_b (because the first term in square brackets would be less than one). If so, marginal benefit would be monotonically decreasing in effort. However, for large enough values for σ_b^2, the term in square brackets is positive at low levels of effort, so the marginal benefit curve first rises in effort and then falls. Figures I (a) and (b) are drawn for low values of σ_a^2 and high values of σ_b^2 respectively.[24]

Further, recall that a noisier outcome in task B also increases the optimum effort level in task A. Given substitutability of effort across tasks, a large σ_b^2 not only lowers the marginal benefit of resources devoted to B, but also raises the marginal cost for B(i.e. the y-intercept in Figure I(b)). Therefore, at zero effort, the marginal cost of effort can exceed the marginal benefit in good B. Lemma 1 captures the implication of this fact for equilibrium outcomes.

LEMMA I: *Given $\mu_j > 0$ (a multiplicative production function), public goods j with a large σ_j^2 (low visibility) are prone to having multiple equilibria in resource allocation.*

Proof: See Appendix. □

[24]Observe from equation(13) that if task A had a multiplicative production function, a small enough σ_a^2 would result in a downward sloping MB curve. We use the linear production function, and hence the horizontal MB curve for A to simplify exposition.

Thus, there can be multiple (stable)equilibria for task B, including one at zero effort; in task A, however, only a unique equilibrium effort level can exist, given a horizontal marginal benefit curve and an upward sloping marginal cost curve. As seen in Figure I(b) then, an economy could be caught in a low-equilibrium trap in the provision of low visibility public goods. Intuitively, if the electorate expects low effort by the government but sees a large output realized, it is more likely to credit such an outcome to chance, or to the complementary inputs, rather than to the government's ability; hence the government has little incentive to put in effort, given low expectations. On the brighter side, however, it is precisely in the case of such public goods that there can be a significant improvement in outcomes because of say, public awareness or media campaigns. By increasing voter expectations of government's (equilibrium) effort, such campaigns increase the government's incentive to put in effort. With higher expected effort, good outcomes are attributed more to the government's ability than to the quality of other exogenous factors or to pure luck.

The phenomenon described here accords with the idea that voter apathy can lead to inferior outcomes — though it also suggests that a more demanding electorate can improve outcomes in low visibility public goods such as health (malnutrition), education etc., through higher expectations.[25] In the absence of such concerted demands for better government, more democratization could actually worsen the provision gap between high and low visibility public goods. This is the next issue that we address.

PROPOSITION III. *Given Lemma 1 and an equilibrium where* $e_b^* = 0$ *initially, an increase in* D *widens the gap in the resources allocated between the more and the less visible public goods, upto some intermediate level of democracy* $D' > 0$. *However, for* $D > D'$, *this gap decreases.*

PROOF: See Appendix . □

Figures II(a) and (b) consider the impact of an increase in the degree of democracy on the marginal benefit and marginal cost curves of both tasks. An increase in the degree of democracy shifts the marginal benefit (MB) curve upwards for both tasks(as seen from equation (10)).

Insert Figures II(a) and (b) here

[25] We have not attempted to make any argument as to whether the public good in question is likely to attain the low or high equilibrium. See Morris and Shin (2000) on this issue of eliminating multiple equilibria, albeit in a somewhat different context.

In the case of the high-visibility good A, there is always an increase in the optimum level of effort, starting from the unique initial equilibrium. Given substitutability across goods, this shifts up the marginal cost (MC) curve for good B. Starting from $e_b^* = 0$, small increases in the degree of democracy can result in the new MC curve still being higher than the new MB curve. Thus, in spite of an increase in democracy, the low-visibility task could remain stuck at the low equilibrium trap, even as the equilibrium effort in the high visibility task increases – raising the effort gap across tasks. For larger increases in D, the upward shift in the marginal benefit curve eventually dominates the shift in the cost curve (provided the degree of substitution across tasks, C_{ab} is not too large). For a sufficiently high degree of democracy then, the outcome in the low-visibility task has a unique high-effort equilibrium as well, such that further increases in democracy bring down the resource-effort gap between the two public goods.

Thus, allowing for interaction between effort and ability in the provision of public goods provides us with two additional insights. First, it shows that voter expectations can play a crucial role in determining outcomes in the provision of low visibility public goods such as health, sanitation or education (as opposed to famine relief or defence during war). To this end, it suggests a role for active public awareness and mass communication campaigns to improve outcomes. Also good governments can have spillover effects beyond their tenure in office: by raising the expectations of the electorate, they could permanently improve matters. Second, we find that the impact of greater democracy on the provision of low-visibility public goods need not be monotonic – greater democracy can worsen the gap in resource allocation between the high and low visibility public goods at initial stages of democracy; things do however improve at high levels of democracy.

4 Further Issues: Heterogeneity and Newsworthiness

4.1 Heterogenous Voters

In our analysis of the political economy of public good provision so far, we have relied on a representative voter framework, so as to highlight the impact of differences in the visibility on public good provision. This might suggest that the politics of visibility is only applicable to public policies that engender *low* dimensional conflict amongst a heterogeneous set of voters. In this section we sketch out an example to suggest that visibility can be important even in

the presence of heterogeneity among voters.[26]

Heterogeneity can take various forms: There may be differences in preferences across voters or there may be differences in the visibility of public goods across groups of voters. Most generally, differences in preferences across groups of voters may go hand in hand with differences in their visibility of various public goods. We adapt the benchmark model to consider a case of two voter groups $g = \{1, 2\}$ that differ from each other in their preferences *and* also the visibility of the two public goods. Group 1 prefers good A and group 2 prefers good B. In addition, members of group 1 are also better positioned to observe/assess government performance in providing good A than in good B. For simplicity, we capture this by assuming that each group can only observe the outcome of the public good they care about. However, members of group 1 observe their outcome with less noise than their counterparts in group 1, i.e. $\sigma^2_{2b} > \sigma^2_{1a}$, where σ^2_{2b} is the noise in the outcome of good B observed by members of group 2 and σ^2_{1a} is the noise in the outcome of good A observed by members of group 1. Such differences in visibility across groups of voters may arise, for instance, if members of group 1 are more literate. Alternatively, they may have better access to information through the media, or through a denser network arising from higher spatial concentration of individuals(as is true in an urban area). To keep things interesting, we assume that the proportion p_2 of group 2 voters is larger, i.e. $p_2 > 0.5$ and $p_1 + p_2 = 1$.
Based on this framework, we can show that the optimal effort level for good A is given byWe have omitted the θ_i variable for exogenous inputs.:

$$p_1 . \frac{\sigma^2_\tau \sigma^2_{2b}}{(\sigma^2_\tau \sigma^2_{2b} + \sigma^2_{1a}\sigma^2_{2b} + \sigma^2_\tau \sigma^2_{2b})} = \partial C(e_a, e_b)/\partial e_a \tag{14}$$

The equivalent expression for the optimal effort level for B is given by:

$$(p_2) \frac{\sigma^2_\tau \sigma^2_{1a}}{(\sigma^2_\tau \sigma^2_{2b} + \sigma^2_{1a}\sigma^2_{2b} + \sigma^2_\tau \sigma^2_{2b})} = \partial C(e_a, e_b)/\partial e_b \tag{15}$$

The question that such heterogeneity in the voter population raises is: Will visibility differences still induce the government to bias resources in favor of good B, if the majority group prefers the other good, A? It can be shown that the government would still favor the more visible good B preferred by the minority group 2, if B's visibility to group 2 is sufficiently greater than that of good A to the majority group 1. Based on equations (14)

[26] A more complete treatment of the impact of heterogeneity on visibility effects is provided in an urban-rural context in Majumdar,Mani,Mukand(2001).

and (15) above, a visibility bias towards the minority's preferred good will occur if

$$\frac{p_2}{1-p_2} < \frac{\sigma_{2b}^2}{\sigma_{1a}^2}$$

The condition above states that as long as the size of the majority group(2) is not too large, relative to the visibility advantage of the minority group (1) with respect to good B's outcome, resources will be skewed in favor of their preferred good B.

While extremely simple, the above example captures the essence of our argument – that even with heterogenous preferences among voter groups of different sizes, the impact of visibility can be strong enough to overwhelm the impact of preferences of the majority group. As a result, resources could be biased in favor of goods preferred by the smaller group, due to their greater visibility.

4.2 Press Freedom, 'Newsworthiness' and Visibility:

In this paper our focus has (so far) been restricted to only one aspect of democratization – namely, greater political competition. However, an important aspect of greater democratization is the increase in civil rights – which includes the right of the media and newspapers to scrutinize, report and criticize governmental policies. Several recent papers (Stromberg(2001), Djankov et al(2001) and Besley and Burgess(2000)) have pointed out that such public scrutiny of politicians and their policies can influence policy making effectively. However, we would argue that while public officials are likely to be more responsive when there exists a free press, their responsiveness depends on the 'newsworthiness' of the issue. In particular, the 'newsworthiness' of an issue is related to its visibility. Hence, explicitly incorporating a role for greater press freedom as an aspect of democracy is unlikely to completely undermine the role of visibility in determining resource allocation decisions.

There are two distinct channels through which the newsworthiness of issues may depend on their visibility. First, since voters (correctly) put less weight on public good outcomes with greater noise in determining government competence, their demand for information on these public goods would be lower. Such low demand would make it less attractive for newspapers to provide information on these issues. Second, lower visibility of certain public goods would increase the resources a newspaper would have to expend to garner reliable information on them. For instance, since the quality of a good/service is less visible than the quantity provided, it is cheaper for a newspaper to collect information on the number of schools in

an area than the quality of education that they provide. Greater cost of information for low visibility public goods will hence reduce the optimal supply of information on their outcomes as well. Our point is a simple one – namely, that some stories are more newsworthy than others. Thus, newsworthiness of issues to a newspaper depends directly on their visibility, and the relative neglect of low visibility issues can persist in spite of greater press freedom under democracy. As Sen(1982) himself admits in the context of malnutrition discussed in section 5: *'Non-acute, regular starvation does not attract much attention in newspapers. These standard events in India seem not to be newsworthy.*[27]

[27]The effects of visibility on newsworthiness and media coverage discussed above can be captured in a stylized example, based on Stromberg(2001)'s model of the media. There exists a monopoly news company that sells newspapers at an exogenously fixed price p. Citizens obtain utility ρ from information about the competence of the government, where $\rho \equiv \rho(\frac{q_a}{\sigma_a}, \frac{q_b}{\sigma_b})$ is increasing in both its arguments. Here q_a and q_b are the shares of newspaper space devoted to good A and good B respectively; σ_a and σ_b are as defined before. In addition to news about government competence, readers also care about other information, say about the weather, dining out and entertainment etc., where each reader i attaches a value γ_i to such information. Each citizen i will therfore purchase a newspaper only if

$$\rho(\frac{q_a}{\sigma_a}, \frac{q_b}{\sigma_b}) + \gamma_i \geq p$$

. We assume that $(p - \gamma_i) \sim U[0, 1]$. Hence, the fraction of citizens who purchase the newspaper is given by $\rho(\frac{q_a}{\sigma_a}, \frac{q_b}{\sigma_b})$ itself.

On the cost side, issues with low visibility are costlier for the newspaper to cover. However, a higher degree of democracy D, is associated with greater press freedom and lowers the cost of information collection and reporting. The newspaper's problem then, is to choose the space devoted to coverage of public goods A and B, so as to maximize its profit. Its objective function can be expressed as follows:

$$Max_{q_a, q_b} \Pi = p.\rho(\frac{q_a}{\sigma_a}, \frac{q_b}{\sigma_b}) - C(q_a\sigma_a, q_b\sigma_b).\frac{1}{D} \tag{16}$$

In (16) above, the demand for information on goods A and B (first expression) is decreasing in σ_a and σ_b respectively, while the cost of providing this information (second expression) is increasing in these same respective noise terms. Hence, the solution to (16) would show that the optimal space devoted to good A is decreasing in its noise term σ_a and increasing in σ_b (and vice versa for good B). To observe the impact of greater democratization, consider the two extremes. In the absence of democracy (i.e. $D = 0$), it is too costly for a newspaper to report any news on either issue that is genuinely informative about the ability of the government(so it only reports on other information such as dining, weather etc..) But even when there is absolute press freedom, i.e. $D = 1$, news coverage of these issues about the government's competence is going to be an increasing function of the differences in the extent of visibility.

Thus, an increase in press freedom does not lead to a uniform increase in reporting on all issues of public interest; low visibility issues are still less likely to pass the test of newsworthiness.

5 Famines and Malnutrition: Suggestive Evidence

In the previous sections, we have analyzed the impact of differences in the visibility of public goods as well as the political regime, on government provision of these goods. In this section, we discuss public good outcomes across different political regimes for two specific issues, famine prevention and malnutrition. While our analysis is only suggestive and there may be additional factors at work, we show how these outcomes are consistent with our theoretical analysis.

In terms of their visibility, famines and malnutrition are a striking contrast. Famines involve a sudden and substantial loss of life within a very short time frame. In contrast, the effect of malnutrition is not as dramatic – yet it is no less a killer, a quiet and unobtrusive one. Compared to most other economic outcomes, it is non-controversial to assert that famine occurrence is 'more visible' than the incidence of malnutrition. This is due not only to the difference in the direct observability of the former (i.e. $\sigma^2_{famine} < \sigma^2_{malnutrition}$), but also due to a larger number of complementary factors, such as climate, health awareness in the population etc. that determine (mal)nutrition outcomes(i.e. $n_{famine} < n_{malnutrition}$). In this sense, malnutrition is a more complex issue to tackle, making it harder to isolate the government's influence on the final nutrition outcome. Given these features, famines and malnutrition are a very suitable pair of candidates to examine the impact of visibility differences in comparing the effectiveness of more versus less democratic regimes. Note however, that our theory makes predictions about the *relative* performance of democracies on more (i.e. famine prevention) versus less visible public good outcomes (i.e. malnutrition prevention) rather than absolute performance.

Let us take a look at the comparative statistics on famines versus malnutrition incidence.[28] Devereux(2000) estimates that the overall excess mortality associated with famines in the twentieth century is around 70 million. While this is a large number, the malnutrition numbers are in fact, even more staggering. In 1995 *alone*, the WHO estimates that out of 11.6 million deaths among children under five in developing countries in 1995 alone, 6.3 million – or as much as 54 % – were associated with malnutrition.[29] Thus, a rough approximation based on these numbers suggests that the annual loss of life due to malnutrition is several times

[28] Ideally, we would have liked to look at numbers on resources allocated by governments for prevention/relief from famines and malnutrition. However, for want of such data, we present information on the actual outcomes for these two public goods.

[29] Source: Page 5, WHO Global Database on Child Growth and Malnutrition, 1997.

greater than that due to famines. This fact is obscured by the low visibility of malnutrition(as first pointed out by Sen). Differences in the incidence of these problems across various parts of the globe tell us more.

A remarkable finding of the analysis of famines is that the prime cause of a famine is often not food shortage. This analysis has also shown that public and government responses to a bad harvest can play a big role in determining whether it in fact results in a famine.[30]. But even more remarkable than this insight about famines in the midst of plenty, is the contrast between the incidence of famines in democracies and non-democracies. Using Devereux's(2000) comprehensive data on famines in the twentieth century, we find that out of the total famine toll of 70 million, only a maximum of 130,000 casualties have occurred in democracies – in other words, 99.98% of all famine deaths have occurred in non-democracies![31]
,Of course, it is true that most non-democracies are also poor countries, so it could be poverty that is driving this phenomenon. In order to ascertain whether this is the case, one approach is to compare famine incidence in a large and poor democracy such as India with that of another large country such as China. Sen(1981) does exactly this in his classic treatment on famines. He finds that compared to China's five famines that killed 46.5 million, democratic India has seen only a single famine for which the upper estimate of the death toll was 130,000. This contrast holds up in terms of the percentage of the national population lost due to famines as well. The Great Leap famine in China killed 4.5% of China's population. In contrast, the sole famine that occurred in India resulted in a loss of well below 0.01 percent of the population. This difference in famine incidence is particularly striking, given that per capita food availability has been higher in China than in India throughout this period. Thus, it is not poverty alone, but also the political regime that seems to affect famine outcomes. To cite another very recent instance, the most severe famine in the last decade took place in the most extreme dictatorship prevailing – North Korea, where the famine wiped out between 2.8 to 3.5 million people, or about 12-15% of the population.

[30]To take specific instances, there is evidence that during the Great Irish famine of 1846-50 that resulted in 1 million deaths and an outmigration of 2 million people(out of a population of 8 million), food was continuously being exported out of the country. To take another case, the year of the Great Bengal Famine in India (1943) was a year where output was much higher than the previous year; so also in the case of the Bangladesh famine(1974): the districts that were worst hit by the famine were the ones that had the largest bumper harvest in the previous year; during the Irish famine of 1846-48, there were large exports of food grain were reported. See Sen(1990) for a discussion of these and other famine occurrences

[31]See Table 1 in the Appendix and pages 6-9, Devereux(2000) for further details.

Overall, democracies do seem to be much better equipped at famine prevention than non-democracies. There are two plausible reasons for this – greater political competition and civil liberties, including a free press.[32] Given these two aspects of democracies, it may seem reasonable to expect that they should result not only in more effective famine prevention by democractic governments, but also greater government effort in public good provision, overall. In fact, our model above cautions that this need not be the case.

So what is the record of democracies, which are so effective in tackling famines, with regard to malnutrition? The answer, based on our simple cross-country analysis below, is: not any better than non-democracies, perhaps worse. To see this, we use data on malnutrition from the WHO Global database on Child Growth and Malnutrition(1997). Our measure of malnutrition is the percentage of children, age five or lower, that are malnourished (underweight or stunted). The index of democracy used is a transformation of the Freedom House index, and is identical to the one used by Rodrik(1999) and others. We control for some important factors that we believe affect the degree of malnutrition. Foremost is the calorie availability per capita. This data is obtained from the FAO Statistics Yearbook for various years. We also control for the degree of female adult literacy as reported in the Human Development Report(1997). Further, the WHO Global database(1997)reports substantial regional differences in the prevalence of malnutrition.[33] Hence, we introduce region dummies for South Asia, Middle East/North Africa, Sub-Saharan Africa and Latin America.[34] Our data on malnutrition covers 38 countries over a time period between 1987 and 1995. There are multiple observations for some countries, and all countries are not covered for all years in this time period. To maximize the number of observations, we therefore use the mean of the observations available for each country over this period. For each data point on malnutrition, the independent variables used are from the closest previous year for which data is available.

Insert Table I and Figure III here

[32]See Besley and Burgess(2000) for a careful study of the impact of media on public resource allocation towards disaster relief in India.

[33]It estimates that the risk of being malnourished (measured in terms of being underweight) is 1.2 times higher in Asia than in Africa and three times higher in Africa than in Latin America. Also, the E-DAT Disaster database suggests that unlike the other two regions, Latin America almost never suffers from droughts.

[34]Within Africa, the risk of malnutrition is highest in Sub-Saharan Africa. Across regions within Asia, the risk of being malnourished is highest in South Central Asia – both in terms of prevalence rates and absolute numbers.

The picture that emerges from our analysis – as seen in the partial scatter plot of malnutrition on the degree of democracy above – is that developing economies with a higher degree of democracy are no better at tackling malnutrition than those without. We tried a number of different specifications and in general, the coefficient on democracy is either significant positive, positive but insignificant or negative and insignificant. Even if it is possible that the picture on malnutrition is muddied due to data or other issues, the relative disparity in the performance across these two public goods is quite overwhelming. Hence our theoretical predictions about the *relatively* strong performance on more visible (e.g. famine prevention) rather than less visible public goods (e.g. malnutrition prevention) is likely to survive.

As Sen admits in the case of India: *'India's record on eliminating endemic non-acute hunger is quite bad.. It is amazing that in a country with as much politicization as India has, the subject of persistent hunger of a third of the rural population can be such a tame issue.'* Indeed not only are an overwhelming majority of Indian children malnourished, bu the WHO reports that over 50 % of malnourished children across *all* developing countries in the world live in South Asia – most of these in India. Indeed, the country's success in famine prevention is all the more remarkable, given that severe malnutrition makes children more susceptible to disease and death, should famine-like conditions prevail. In other words, low famine incidence cannot be attributed to better overall health of the population.

Any comprehensive explanation of the differences in cross-country government responsiveness in famine versus malnutrition prevention is likely to have several dimensions. While our analysis above is only suggestive, we do believe that our emphasis on the politics of visibility in influencing government responsiveness is an important part of the answer. It suggests substantial effort on the part of the government in averting disasters with high visibility, and substantial neglect of less visible, but equally important issues.

6 Conclusion

This paper is an attempt to understand the incentives that underlie government responsiveness to various issues. We make a simple point, that we argue deserves more attention – namely that the 'visibility' of a public good matters. In a world where governments provide a multiplicity of public goods, differences in the extent of visibility across public goods, distort governmental incentives. Governments have an incentive to allocate public resources towards more visible goods. Our model provides an explanation for government neglect in the provi-

sion of several essential public goods, despite their considerable benefits and throws light on the even more puzzling phenomena of voter apathy towards such neglect. We demonstrate that greater democratization widens the gap in resource allocation between more versus less visible public goods, up to an intermediate level of democracy. Beyond this level, the gap decreases. Furthermore, public goods with low visibility are more prone to multiple equilibria in resource allocation, with outcomes being a function of voter expectations.

We believe that further exploration of the relationship between governmental responsiveness and the visibility of economic outcomes will be fruitful. For example, it would be useful to further explore different dimensions of the relationship between visibility and voter heterogeneity. Similarly, it would be of interest to carry out a more careful empirical analysis of the implications of differences in visibility on government expenditures. We leave these and other issues for future work.

References

1. Anand, S. and Ravi Kanbur (1989); "Public Policy and Basic Needs Provision in Sri Lanka", in Dreze, Husain and Sen (1989)

2. Baland, Jean-Marie and Ashok Kotwal (1998); "The Political Economy of Underinvestment in Agriculture", *Journal of Development Economics*, 55(1):233-47

3. Banerjee, Abhijit and Rohini Somanathan (2001); "Caste, Community and Collective Action: the Political Economy of Public Good Provision in India", mimeo. MIT

4. Bardhan, Pranab (1984, 1999);*The Political Economy of Underdevelopment*, Oxford University Press

5. Bardhan, P. and Mookherjee, Dilip (1999); Expenditure Decentralization and the Delivery of Public Services in Developing Countries, *IED Working Paper*

6. Barro, Robert (1999); "Determinants of Democracy", *Journal of Political Economy*, vol 107, no.6 pt.2, pp S158-184.

7. Besley, T. and Robin Burgess (2000); Does Media Make the Government More Responsive? Theory and Evidence from Indian Famine Relief Policy *Working Paper, LSE*

8. Besley, T. and Coate, S. (2000); "Non-Majoritarian Outcomes and the Role of Citizen's Initiatives", *Working Paper, LSE*

9. Betancourt, Roger and Gleason(2000); "The Allocation of Publicly Provided Private Goods to Rural Households in India: On Some Consequences of Religion, Caste and Democracy", *World Development*

10. Chattopadhyay and Esther Duflo (2001); "Women as Policy Makers: Evidence from and India-Wide Randomized Policy Experiment", *mimeo.* MIT

11. DeGroot, Morris (1970); *Optimal Statistical Decisions*, New York, McGraw Hill.

12. Devereux, Stephen(2000): Famines in the Twentieth Century – *Institute for Development Studies* Working Paper, no. 105 – University of Sussex

13. Dewatripont, M., Jewitt, I. and Jean Tirole (1999 a); "The Economics of Career Concerns, Part I: Comparing Information Structures, *Review of Economic Studies*, 66, 183-198

14. Dewatripont, M., Jewitt, I. and Jean Tirole (1999 b); "The Economics of Career Concerns, Part II: An Application to Missions and Accountability of Government Agencies", *Review of Economic Studies*, 66, 199-217. DeGroot, Morris(1970); *Optimal Statistical Decisions*, New York, McGraw Hill

15. Djankov, S., C. McLeish, T. Nenova and A.Shleifer. (2000); "Who Owns the Media?", *NBER Working Paper 8288*

16. Dreze, Jean, Athar Husain and Amartya Sen (1989); *The Political Economy of Hunger, Vol. I-III*, Oxford University Press

17. Dreze, Jean and Amartya Sen (1995);*India: Economic Opportunity and Social Change*, Oxford.

18. Dreze, Jean and H.Gazdar (1996);"Uttar Pradesh: the Burden of Inertia" in *Indian Development: Selected Regional Perspectives*, ed. Jean Dreze and A. K. Sen (1996)

19. Foster, Andrew and Mark Rosenzweig (2001); "Democratization, Decentralization and the Provision of Public Goods in a Poor Rural Economy", Brown University Working Paper

20. Hoff, Karla(2000) "Beyond Rosentein-Rodan: The Modern Theory of Coordination Problems in Development", *mimeo.* World Bank

21. Holmstrom, Bengt (1982, 1999) "Managerial Incentive Problems: A Dynamic Perspective", *Review of Economic Studies*, vol. 66

22. Holmstrom, Bengt and Paul Milgrom (1991)"Multi-Task Principal-Agent Analyses: Incentive Contracts, Asset Ownership and Job Design" *Journal of Law, Economics and Organization*, 7, 24-52

23. Majumdar, S., Mani, A. and Sharun Mukand (2001) "Politics, Information and the Urban Bias" mimeo. Queens University and Williams College

24. Morris, S. and H-S Shin (1998); "Private versus Public Information in Coordination Problems", *Working Paper, Yale*

25. Ram, N. (1989); " An Independent Press and Anti-Hunger Strategies: The Indian Experience" in Dreze and Sen (1989a)

26. Rodrik, Dani (2000); "Institutions for High Quality Growth: What They Are and How to Acquire Them" *NBER Working Paper 7540*

27. Rogoff, K. (1990); " Equilibrium Political Budget Cycles", *American Economic Review* 80, p21-36

28. Sen, A.K.(1982): 'Coromandel Lecture' New Delhi: As published in *The Hindu*

29. Sen, A.K.(1990): *Resources, Values, Development* – Oxford University Press

30. Sen, Amartya (1999); *Development as Freedom*, Oxford University Press

31. Stromberg, David (2000); Mass media and public policy, *European Economic Review* 45, 2001, 652-663.

32. WHO Global Database on Child Growth and Malnutrition(1997): Compiled by de Onis, Mercedes and Blossner, Monika, World Health Organization, Geneva

Appendix

Derivation of equations (4) and (6)

For a single task outcome $z = \tau + e + \epsilon + \Sigma_{i=1}^{n}\theta_i$, Bayes' rule says:

$$p(\tau|z,e^*) = \frac{p(\tau).p(z|\tau,e^*)}{p(z|e^*)}$$

Since τ and ϵ are all normally distributed, $z \sim N(\bar{\tau}, \sigma_\tau^2 + \sigma_\epsilon^2 + n\sigma_\theta^2)$. Then, we can write the conditional distribution (see De Groot, 1970 for details)

$$\begin{aligned} p(\tau|z,e^*) &= \frac{p(\tau)p(z|\tau,e^*)}{p(z)} = \frac{\frac{1}{\sqrt{2\pi}}\frac{1}{\sqrt{\sigma_\tau^2}}e^{-\frac{1}{2\sigma_\tau^2}(\tau-\overline{\tau})^2}\frac{1}{\sqrt{2\pi}}\frac{1}{\sqrt{\sigma_\epsilon^2+n\sigma_\theta^2}}e^{-\frac{1}{2(\sigma_\epsilon^2+n\sigma_\theta^2)}(z-\tau-e^*)^2}}{\frac{1}{\sqrt{2\pi}}\frac{1}{\sqrt{\sigma_\tau^2+\sigma_\epsilon^2+n\sigma_\theta^2}}e^{-\frac{1}{2(\sigma_\tau^2+\sigma_\epsilon^2+n\sigma_\theta^2)}(z-e^*-\overline{\tau})^2}} \\ &= \frac{1}{\sqrt{2\pi}}\frac{1}{\sqrt{v^2}}\exp[-\frac{1}{2v^2}(\tau^2 - 2\tau\{\frac{h_\tau\overline{\tau}+h_{\epsilon\theta}(z-e^*)}{h_\tau+h_{\epsilon\theta}}\} + \{\frac{h_\tau\overline{\tau}+h_{\epsilon\theta}(z-e^*)}{h_\tau+h_{\epsilon\theta}}\}^2)] \end{aligned}$$

where $v^2 = \frac{\sigma_\tau^2(\sigma_\epsilon^2+n\sigma_\theta^2)}{\sigma_\tau^2+\sigma_\epsilon^2+n\sigma_\theta^2} = \frac{1}{\frac{1}{\sigma_\tau^2}+\frac{1}{(\sigma_\epsilon^2+n\sigma_\theta^2)}}, h_\tau = \frac{1}{\sigma_\tau^2}$ and $h_{\epsilon\theta} = \frac{1}{\sigma_\epsilon^2+n\sigma_\theta^2}$

From the above, we can infer that the conditional distribution of $(\tau|z)$ is normally distributed with mean $\frac{h_\tau\overline{\tau}+h_{\epsilon\theta}(z-e^*)}{h_\tau+h_{\epsilon\theta}}$ and variance v^2.

Applying the same logic to the case where the voter's inference is based on two outcomes z_a and z_b, instead of a single z, we obtain equation (4), i.e.

$$[E(\tau|\mathbf{z},\mathbf{e}^*)] = [\frac{h_\tau.\bar{\tau}+h_{a\theta}(z_a-e_a^*)+h_{b\theta}(z_b-e_b^*)}{h_\tau+h_{a\theta}+h_{b\theta}}]$$

where $h_{j\theta} = \frac{1}{\sigma_\epsilon^2+n_j\sigma_\theta^2}, j = \{a,b\}$.

Then, substituting $E(z_j) = \bar{\tau}+e_j$, we have equation (6), i.e.

$$E_z[E(\tau|\mathbf{z},\mathbf{e}^*)] = [\frac{h_\tau.\bar{\tau}+h_{a\theta}(\bar{\tau}+e_a-e_a^*)+h_{b\theta}(\bar{\tau}+e_b-e_b^*)}{h_\tau+h_{a\theta}+h_{b\theta}}]$$

Substituting the expression for $E_z[E(\tau|\mathbf{z},\mathbf{e}^*)]$ from the above equation into equation (5)and differentiating with respect to effort levels e_a and e_b, we obtain equations (7) and (8) respectively.

Proof of Proposition I: Differentiate (7) and (8) with respect to σ_a^2 to obtain,

$$F_{aa}\frac{\partial e_a}{\partial\sigma_a^2}+F_{ab}\frac{\partial e_b}{\partial\sigma_a^2}+F_{a\sigma_a^2}=0$$

$$F_{ba}\frac{\partial e_a}{\partial\sigma_a^2}+F_{bb}\frac{\partial e_b}{\partial\sigma_a^2}+F_{b\sigma_a^2}=0$$

We obtain a similar expression by differentiating (7) and (8) with respect to σ_b^2.

$|F_{a\sigma_a^2}| = |\frac{-(h_{b\theta}+h_\tau)h_{a\theta}^2}{(h_{a\theta}+h_{b\theta}+h_\tau)^2}| > |\frac{h_{b\theta}.h_{a\theta}^2}{(h_{a\theta}+h_{b\theta}+h_\tau)^2}| = |F_{b\sigma_a^2}|$ and $|F_{bb}| > |F_{ab}|$ (given symmetric cost functions), where the latter two terms are both negative. This gives us $\frac{de_a}{d\sigma_a^2} = \frac{-F_{a\sigma_a^2}F_{bb}+F_{ab}F_{b\sigma_a^2}}{F_{aa}F_{bb}-F_{ab}F_{ba}} < 0$. In other words, an increase in σ_a^2 results in a reduction in e_a in period one. Similarly, we can calculate the change in effort allocated towards public good B, when the variance associated with good A goes up. Since we assume that the allocation of effort across the two tasks are symmetric substitutes, we have $F_{ab} = F_{ba} > 0$ which results in $\frac{\partial e_b}{\partial\sigma_a^2} = \frac{-F_{aa}F_{b\sigma_a^2}+F_{a\sigma_a^2}F_{ba}}{F_{aa}F_{bb}-F_{ab}F_{ba}} > 0$. A decrease in the variance associated with public good B results in an decrease in the effort allocated to public good A.□

Proof of Proposition 2:

Since the production function being used is $z = \tau+e+\epsilon$, we need to replace $h_{a\theta}$ and $h_{b\theta}$ in the first order conditions in (7) and (8) with $h_a = 1/\sigma_a^2$ and $h_b = 1/\sigma_b^2$ respectively.

Then,differentiating F_a and F_b with respect to D, we have:

$F_{aD} = \frac{R.h_{a\theta}}{h_a+h_{b\theta}+h_\tau} = \frac{R.\sigma_b^2\sigma_\tau^2}{\sigma_a^2+\sigma_b^2+\sigma_\tau^2} > 0$ and $F_{bD} = \frac{R.h_{b\theta}}{h_a+h_{b\theta}+h_\tau} = \frac{R.\sigma_a^2\sigma_\tau^2}{\sigma_a^2+\sigma_b^2+\sigma_\tau^2} > 0$. Differentiating equations(7)and (8) we have

$\frac{de_a^*}{dD} = \frac{-F_{bb}.F_{aD_m}+F_{bD_m}.F_{ab}}{F_{aa}.F_{bb}-F_{ab}^2}$ and $\frac{de_b^*}{dD} = \frac{-F_{aa}.F_{bD_m}+F_{aD_m}.F_{ab}}{F_{aa}.F_{bb}-F_{ab}^2}$.

Here, for $j = \{a, b\}, j' = \{b, a\}, F_{jj} = -C_{jj}(e_a, e_b) < 0, F_{jj'} = -C_{jj'} < 0$ and $F_{jD} > 0$

Let us define the aggregate change in effort, due to a change in the degree of democracy as $\Delta_+ = (\frac{de_a^*}{dD} + \frac{de_b^*}{dD})$ and the change in the effort gap across the two tasks, due to a change in the degree of democracy as $\Delta_- = (\frac{de_a^*}{dD} - \frac{de_b^*}{dD})$

(i) $\Delta_+ > 0$ provided $F_{aa}, F_{bb} > F_{ab}$, which holds true. Hence aggregate effort always increases with an increase in D.

(ii) $\Delta_- > 0$ (given $\sigma_a^2 < \sigma_b^2$), provided

(1) $F_{aa}, F_{bb} > F_{ab}$ and

(2)$\frac{|F_{aD}|}{|F_{bD}|} > \frac{|F_{ab}+F_{aa}|}{|F_{bb}+F_{ba}|} \Rightarrow \frac{\sigma_b^{22}}{\sigma_a^{22}} > \frac{|C_{ab}+C_{aa}|}{|C_{bb}+C_{ab}|}$

Condition(1) holds true, as in part(i). Condition(2) holds provided $C(.)$ is not too convex. Weak convexity implies that, for any given $\sigma_a^2 < \sigma_b^2$ (that implies $e_a^* > e_b^*$, from proposition 1), C_{aa} is not too large relative to C_{bb}.[35]

Given that conditions (1) and (2) hold, and $e_a^* > e_b^*$ at any initial degree of democracy, the gap in resource allocation between the more and less visible good increases, as the degree of democracy rises, i.e. $\frac{d(e_a^*-e_b^*)}{dD} > 0$.

Thus, through (i) and (ii) respectively, we have shown that the aggregate effort and the gap in the effort across the two tasks increase with the degree of democracy D.□

Derivation of equation (10)

Using equation (9), the expression for $E_{\mathbf{z}}[E(\tau|z_a, z_b, e_a^*, e_b^*)]$ can be derived, so that the objective function of the government, $MaxE[E(\tau|\mathbf{z}, \mathbf{e}^*)] - C(\mathbf{e})$ is now:

$$\max_{e_a,e_b} \frac{1}{h_\tau + h'_a + h'_b}[h_\tau.\bar{\tau} + h'_a(\frac{(\bar{\tau}(\mu_a e_a + k_a) + e_a - e_a^*)}{\mu_a e_a^* + k_a}) + h'_b(\frac{(\bar{\tau}(\mu_b e_b + k_b) + e_b - e_b^*)}{\mu_b e_b^* + k_b})] - C(e_a, e_b) \tag{17}$$

The first order conditions with respect to effort e_j, given $i, j = \{a, b\}$ are:

$$\frac{h'_j}{h_j + h'_i + h_\tau}[\frac{\bar{\tau}}{\mu_j + 1}] - C_j = 0 \tag{18}$$

The weights $h_\tau = \frac{1}{\sigma_\tau^2}, h'_a = \frac{(e_a^*+k_a)^2}{\sigma_a^2}$ and $h'_b = \frac{(e_b^*+k)^2}{\sigma_b^2}$, therefore

$$\frac{h'_j}{h'_j + h'_i + h_\tau} = \frac{(\mu_j + k_j)^2}{(\mu_j + k_j)^2 + (\mu_i + k_i)^2 \frac{\sigma_j^2}{\sigma_i^2} + \frac{\sigma_j^2}{\sigma_\tau^2}}$$

[35] For example, with a twice differentiable symmetric cost function such as $C(e_a, e_b) = (e_a^3 + 3e_a^2 e_b q + 3e_b^2 e_a q + e_b^3), q \in (0, 1)$ being the degree of substitutability across the two tasks, this would simply imply that $\frac{\sigma_b^{22}}{\sigma_a^{22}}$ be large relative to $[6(e_a + e_b)/6(e_b + e_a)] = 1$, which will always be true.

Given the parametric restrictions imposed on μ_a, μ_b, k_a and k_b, the first order conditions are then reduced to the forms expressed in equations (11) and (12).

Proof of Lemma 1:
(Refer to Figures I (a) and (b).) Lemma 1 claims that there exist parameters such that there is a unique equilibrium in task A and multiple stable equilibria in task B (one at $e_b^* = 0$ and another at $e_b^* \gg 0$), as shown in Figures II (a) and (b). To prove Lemma 1, we spell out the conditions that ensure the existence of such an equilibrium, and the parametric restrictions that satisfy these conditions. We then use these conditions to establish Proposition III.
Based on the marginal benefit(MB) and marginal cost(MC) curves in Figure I(a) and (b), the conditions for a unique equilibrium for good A and multiple equilibria for good B are:

(1) The MB curve for good A is decreasing/linear in e_a, while that for good B is first increasing and then decreasing in e_b. (2) Over the rising segment of the MB_b curve, the slope of $MC <$ the slope of MB. (3) $MC < MB$ for good A at $e_a = 0$ and $MC \geq MB$ for good B at $e_b = 0$.

Condition (1) is a necessary (but not sufficient) condition for the presence of a unique equilibrium in good A and multiple equilibria in good B. Conditions (2) and (3) jointly ensure a unique intersection between the MB_a and MC_a curves, and multiple intersections between the MB_b and MC_b curves. We now demonstrate that for σ_a^2 small enough and σ_b^2 large enough, all the above three conditions are satisfied, hence generating the equilibrium proposed.

PART 1: To begin, fix $k, D = \hat{D}$, where $0 \ll \hat{D} \ll 1, \bar{\tau}$ and σ_τ^2. Thus, the only parameters that we perturb from now on, are σ_a^2 or σ_b^2.
From equation (11), condition(1) holds for task A, since the expression for MB_a is linear in e_a. From (13), condition (1) holds true for task B if the expression within square brackets in (13) is negative at low values of e_b, and positive for high values of e_b. To see that this does hold true note that, at $e_b = 0$, this expression in (13) becomes $\frac{\sigma_b^2}{k^2}(\frac{1}{\sigma_\tau^2} + \frac{1}{\sigma_a^2})$ which is greater than 1 for σ_a^2 low enough and σ_b^2 high enough. Further, this expression is decreasing in e_b, hence by continuity, there exists an $e_b' > 0$ such that for $e_b \geq e_b'$, $\frac{\sigma_b^2}{(e_b+k)^2}(\frac{1}{\sigma_\tau^2} + \frac{1}{\sigma_a^2}) \leq 1$. Thus, condition (1) is satisfied for σ_a^2 small enough and σ_b^2 large enough.

PART 2: From part 1, there exists an e_b' such that $\left[\frac{\sigma_b^2}{(e_b'+k)^2}(\frac{1}{\sigma_\tau^2} + \frac{1}{\sigma_a^2}) = 1\right]$ in equation (13).[36] Then, condition(2) requires that, for $e_b \in [0, e'_b)$, the slope of the MB_b curve is greater than that of the MC_b curve, i.e. :

$$\frac{\hat{D}(\bar{\tau}+1)(e_b+k)^2}{\sigma_a^2\sigma_\tau^2(\frac{\sigma_b^2}{\sigma_a^2} + \frac{\sigma_b^2}{\sigma_\tau^2} + (e_b+k)^2)^2}\left[\frac{\sigma_b^2}{(e_b+k)^2}(\frac{1}{\sigma_\tau^2} + \frac{1}{\sigma_a^2}) - 1\right] > C_{bb} \tag{19}$$

By continuity, the LHS of the above equation is positive, hence condition (2) will hold, provided the cost function is not too convex.

[36] Hence, for all $e_b \in [0, e'_b]$, $F_{bb} \geq 0$, and the MB_b curve is upward sloping.

PART 3: Condition (3) claims that there exist parameters such that $e_a^* = 0$ is not an equilibrium, while $e_b^* = 0$ is an equilibrium. To help demonstrate this claim, we first compute $\frac{de_b^*}{d\sigma_b^2}$.

Using (11) and (12), by Cramer's rule:

$$\frac{de_b^*}{d\sigma_b^2} = \frac{-F_{aa}F_{b\sigma_b^2} + F_{ba}F_{a\sigma_b^2}}{F_{aa}F_{bb} - F_{ab}F_{ba}}$$

It can be verified that $F_{aa} < 0, F_{b\sigma_b^2} < 0, F_{ba} < 0, F_{a\sigma_b^2} > 0, F_{ab} < 0$. Since $F_{bb} > 0$ on the rising portion of the MB_b curve, it can be verified then, that $\frac{de_b^*}{d\sigma_b^2} > 0$ on the rising portion of the MB_b curve (and $\frac{de_b^*}{d\sigma_b^2} < 0$ on the falling portion of the MB_b curve, where $F_{bb} < 0$.)

Now we come to Condition(3). We may represent the cost curve $C(.) \equiv C(e_a, e_b; q)$ where $q \in (0, 1)$ is a parameter that captures the degree of substitutability across the two tasks. As with parameters $k, D, \bar{\tau}$ and σ_τ^2, assume a fixed value for q too, so that σ_a^2 or σ_b^2 are the only parameters we may perturb. Then, our claim is that there exist values for these parameters such that Condition(3) holds. This implies that, for σ_a^2 small enough and σ_b^2 large enough, $e_a^* \gg 0$ and $e_b^* = 0$ is an equilibrium, i.e. equations (11) and (12) would be:

$$\bar{\tau}\hat{D}\frac{1}{1 + \frac{\sigma_a^2}{\sigma_\tau^2} + (e_b^* + k_b)^2\frac{\sigma_a^2}{\sigma_b^2}} > C_a(e_a, e_b^*; q)|_{e_a=0} \tag{20}$$

and

$$\bar{\tau}\hat{D}\frac{(e_b + k)(\bar{\tau} + 1)}{\frac{\sigma_b^2}{\sigma_a^2} + \frac{\sigma_b^2}{\sigma_\tau^2} + (e_b + k)^2} \leq C_b(e_a^* \gg 0, e_b)|_{e_b=0} \tag{21}$$

where $e_b^* = 0$ in (20). Suppose not. Then, there are three possible cases as listed below.

(i) $LHS \leq RHS$ in (20) and $LHS > RHS$ in (21)
(ii) $LHS > RHS$ in (20) but $LHS > RHS$ in (21),
(iii)$LHS \leq RHS$ in (20) though $LHS \leq RHS$ in (21)

Let us take the first of the three cases above. Since $LHS > RHS$ in (21) under this case, $e_b^* \gg 0$. Now consider how an increase in σ_b^2 would change this condition.[37] The effect on the the LHS and the RHS of (20) depends on how e_b^* changes with σ_b^2. As shown above, at the stable positive e_b^*, $\frac{de_b^*}{d\sigma_b^2} < 0$.

Therefore, with a rise in σ_b^2, the LHS of (20) increases, and the RHS decreases. For a large enough increase in σ_b^2, we will have $LHS > RHS$ in (20). Similarly, in (21) the LHS (evaluated at $e_b = 0$) falls due to the rise in σ_b^2, and given that $e_a^* \gg 0$ now, the RHS rises. Thus, with σ_b^2 large enough, condition (3) is satisfied if case (1) initially holds.

[37] Alternatively, we could consider a decrease in σ_a^2. The idea is to lower the ratio $\frac{\sigma_a^2}{\sigma_b^2}$.

Alternatively, consider the second case to be true initially. Again, an increase in σ_b^2 will increase the gap between the LHS and RHS in (20). In (21), a large enough rise in σ_b^2 will increase e_a^* sufficiently on the RHS, even as the LHS falls with a rising σ_b^2. Eventually, we have $LHS \leq RHS$ in (21), so that condition (3) holds again.

Finally, in the third case, $e_b^* = 0$ initially. Then, an increase in σ_b^2 will increase the LHS in (20), with no change in the RHS at $e_a = 0$. For a large enough increase in σ_b^2, $LHS > RHS$ in (20). As for (21), the gap between the LHS and RHS is widened further, so e_b^* remains at zero. Thus, Condition(3) is once again satisfied, for a large enough σ_b^2 (or equivalently, small enough σ_a^2).

Combining conditions(2) and (3), there is a unique intersection between the MB_a and MC_a curves, but multiple intersections between the MB_b and MC_b curves(as shown in Figures I(a) and (b)). Thus, given σ_a^2 small enough and σ_b^2 large enough, conditions (1),(2) and (3) ensure the existence of a unique equilibrium in task A and multiple equilibria in task B. □

Proof of Proposition 3:
(Refer to Figures II(a) and (b).)
First, it can be verified that

$$\frac{de_a^*}{dD} = \frac{-F_{aD}F_{bb} + F_{bD}F_{ab}}{F_{aa}F_{bb} - F_{ab}F_{ba}} > 0$$

for $F_{bb} > 0$.
From condition (3) above, $LHS \ll RHS$ in (21) for $D \in [0, \hat{D})$. By continuity, there exists a $D' \geq \hat{D}$ such that $LHS = RHS$ in (21). Therefore, for any increase in D in the range from $[0, D'), e_b^*$ remains at zero — i.e. there is no increase in e_b^* as D increases. Since e_a^* is continuously increasing in this range, the gap between e_a^* and e_b^* is increasing in this range. For $D \geq D'$, $e_b^* \gg 0$, so that the gap between e_a^* and e_b^* drops. □

Table 1: Estimated mortality in major 20th century famines

Years	Location(epicenter)	Excess mortality
1903-06	Nigeria (Hausaland)	5,000
1906-07	Tanzania(south)	37,500
1913-14	West Africa (Sahel)	125,000
1917-19	Tanzania(central)	30,000
1920-21	China(Gansu, Shaanxi)	500,000
1921-22	Soviet Union	9,000,000
1927	China (northwest)	3,000,000-6,000,000
1929	China(Hunan)	2,000,000
1932-34	Soviet Union(Ukraine)	7,000,000-8,000,000
1943	China(Henan)	5,000,000
1943	India(Bengal)	2,100,000-3,000,000
1943-44	Rwanda	300,000
1944	Netherlands	10,000
1946-47	Soviet Union	2,000,000
1957-58	Ethiopia (Tigray)	100,000 - 397,000
1958-62	China	30,000,000-33,000,000
1966	Ethiopia(Wollo)	45,000 -60,000
1968-70	Nigeria(Biafra)	1,000,000
1969-74	West Africa(Sahel)	101,000
1972-73	India(Maharashtra)	130,000
1972-75	Ethiopia(Wollo & Tigray)	200,000-500,000
1974-75	Somalia	20,000
1974	Bangladesh	1,500,000
1979	Cambodia	1,500,000-2,000,000
1980-81	Uganda(Karamoja)	30,000
1982-85	Mozambique	100,000
1983-85	Ethiopia	590,000-1,000,000
1984-85	Sudan(Darfur, Kordofan)	250,000
1988	Sudan(south)	250,000
1991-93	Somalia	300,000-500,000
1995-99	North Korea	2,800,000 - 3,500,000
1998	Sudan(Bahr el Ghazal)	70,000

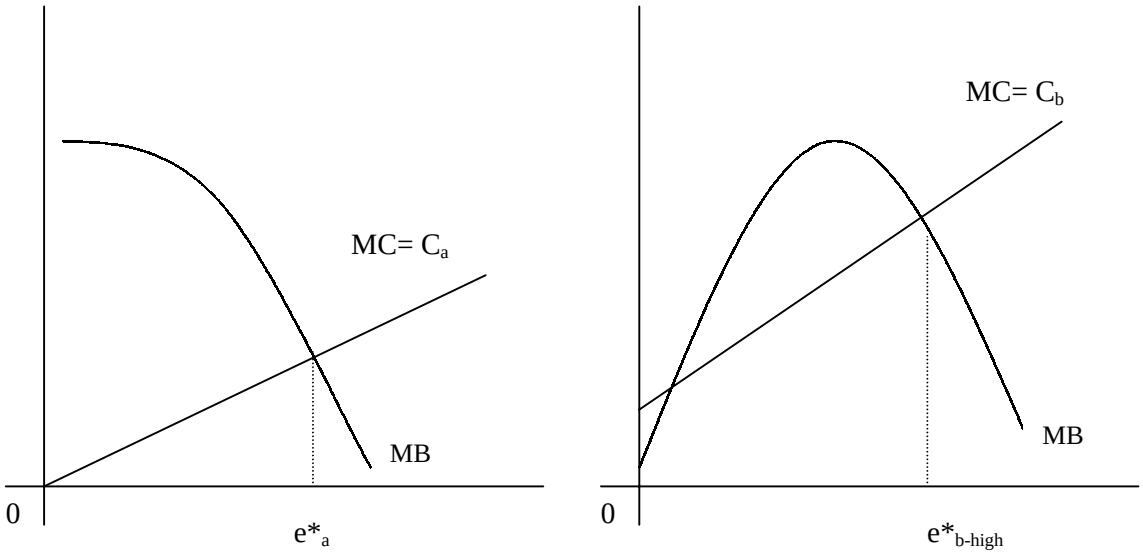
Source: Devereux(2000, table 1)

Table 2: Malnutrition findings:

Dependent variable: Percentage of children under five who are underweight

Variables	(1)	(2)	(3)	(4)
Democracy	-7.50	4.32	3.06	2.08
Index	(-0.63)	(0.30)	(0.22)	(0.18)
Calories per day,	-0.15	-0.16	-1.27	0.03
per capita	(-1.50)	(-1.72)	(-1.32)	(0.37)
Per capita	-0.00	-0.00	-0.00	-0.00
income	(-1.61)	(-0.35)	(-0.50)	(-2.14)
Female adult		-0.28	-0.24	-0.25
literacy, 1995		(-1.92)	(-1.87)	(-2.82)
Corruption			-4.59	-2.04
Index			(-1.81)	(-1.51)
Latin America				-19.24
dummy				(-4.04)
Sub-Saharan Africa				-13.19
dummy				(-2.27)
Middle East				-31.20
North-Africa dummy				(-6.82)
S.Asia dummy				9.13
				(1.50)
Constant	41.10	46.97	57.59	58.21
	(6.66)	(7.99)	(7.75)	(6.36)
R^2	0.31	0.42	0.47	0.82
	N=38	N=38	N=38	N=38

Figures in brackets represent White heteroscedasticity consistent t-statistics.



(a) (b)

FIGURE I

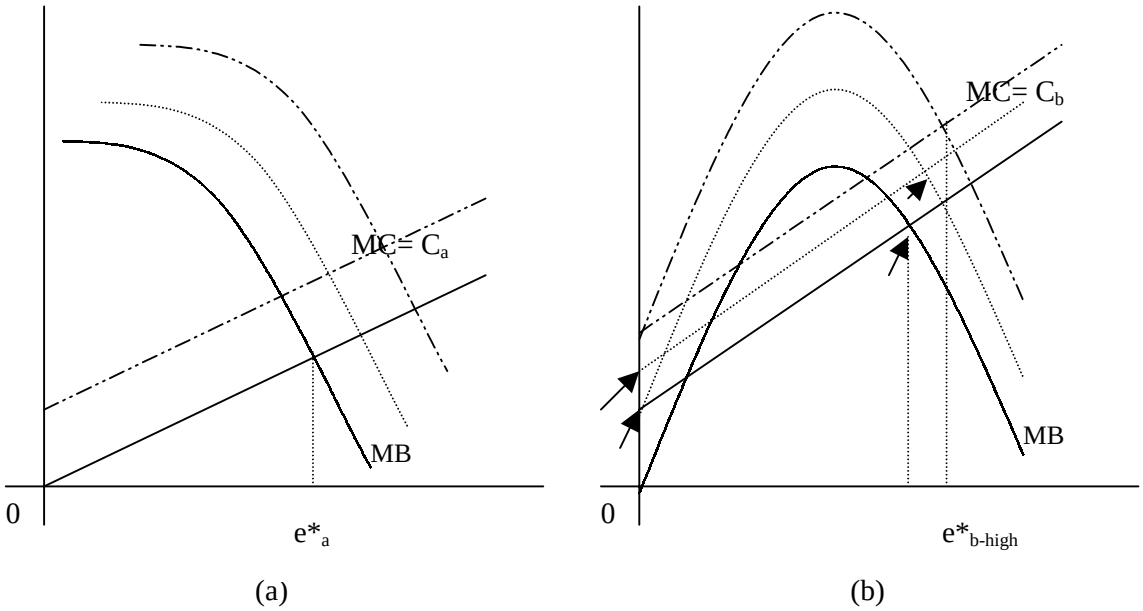
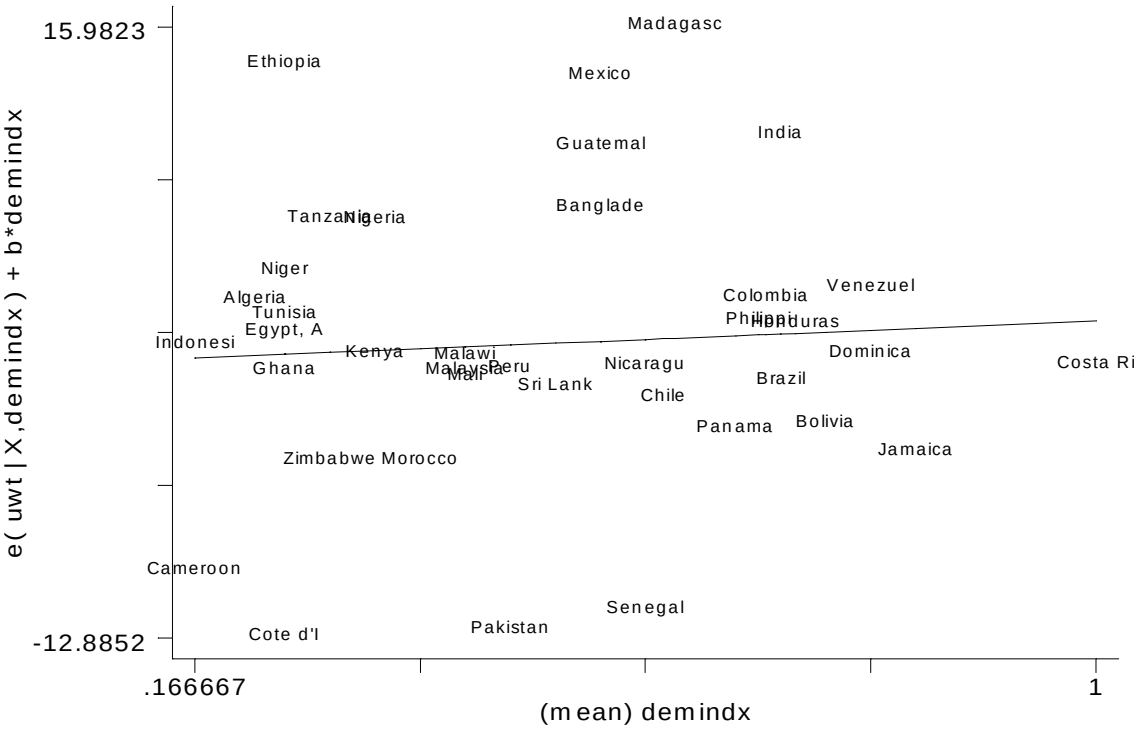


FIGURE II: Non-Monotonic Change in Effort Gap as Democracy Increases



The figure above is a partial residual plot of a measure of malnutrition (i.e. percentage of children at or below five years of age who are underweight) against the democracy index, (as modified from the Freedom House data). The other control variables used to graph this plot include: calorie availability per capita, per capita income, female adult literacy, corruption indices and region dummies.

FIGURE III