Does Media Make Government More Responsive? Theory and Evidence from Indian Famine Relief Policy

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April 28, 2000

Abstract

The role of the media in making government more responsive to policy issues has long been appreciated. Here, we develop a model based on the solution of agency problems – a more informed electorate makes it easier to create performance related incentives for politicians. The model is tested on panel data from India. We show that public distribution of food and calamity relief expenditure are more keenly targeted to shocks in states where newspaper circulation is highest.

*We have received useful comments from Steve Coate, Oriana Bandiera and a number of seminar participants. We are also grateful to STICERD for financial support and Grace Wong for excellent research assistance.

1 Introduction

Improving the quality of government policy requires the development of key institutions. Among those are institutions relating to the flow and dissemination of information. There is a long libertarian tradition dating back to Rousseau, Smith, Hobbes, Locke, Madison, Jefferson and Mill which argues that freedom of the press is essential for citizens to make intelligent and well-grounded decisions about public affairs. Free dissemination of information, it was argued, would lead to more informed policy making and greater transparency in policy formation. Through this mechanism demands of citizens could be expressed thus serving as a check on the activities of government. This is particularly important in situations where swift government action is needed to prevent disaster.

This paper explores further the link between informed populations and government responsiveness. It develops a theoretical framework and tests it using panel data from India (1960-1992). We develop a framework based on the role of the media in solving political agency problems. It is costly for policy makers to act and having a larger fraction of the electorate that is informed can create a stronger link between policy performance and re-election incentives. This results in greater government responsiveness. The test comes from data on public distribution of food and calamity relief expenditures from India. India is prone to droughts and floods and these are a major source of social protection for the vulnerable during crisis periods. We show that in states where the media is more highly developed, the government protects the citizens more. This empirical finding is robust to a number of different ways of looking at the data.

By exploiting variation across states and time in our data set we are able to gain insights into what role media development can play in making state governments more responsive to salient policy issues. This allows us to revisit a literature which examines the importance of the media in famine relief policy (see Ram, 1991). Perhaps the most famous pronouncement on this subject was in Amartya Sen's 1981 Coromanel lecture published as Sen (1984). He observes that:

> "India has not had a famine since independence, and given the nature of Indian politics and society, it is not likely that India can have a famine even in years of great food problems. The government cannot afford to fail to take prompt action when large-scale starvation threatens. Newspapers play an important part in this, in making the facts known and forcing the challenge to be faced." page 84.

This view has now become received wisdom and is rarely questioned.[1] Here, we test the validity of this claim using cross-state policies in India. While there is some case study evidence on this issue, this is the first broad based quantitative test of this idea.

[1] See Bhagwati (1995) for a dissenting voice.

We find that media development, as proxied by newspaper circulation, tends to make governments more responsive to crises thus confirming the central tenet of Sen's thesis. For media to create incentives for candidates to build reputations for responding to crisis it necessary that performance along this dimension can affect voting behavior. This is less likely in polarized societies where voting may be carried out on an ideological basis. The second key set of results in the paper show that polarization, along caste and income dimensions, tends to reduce government responsiveness. We also probe further into the relationship between media development and government responsiveness by looking at disaggregating newspaper circulation by language. We find that it is regional (non-English and non-Hindi) newspapers that are driving our basic results. This is consistent with them being more focussed on local issues and more effective in terms of influencing policy making at the state level. Finally we examine the role of literacy and electoral effects.

The role of the media has received scant attention in political economy models.[2] In this paper we focus on the role of the media in providing information that mitigates political agency problems. The idea that a key role of the press is to inform the electorate is central to the political science literature on the role of mass media.[3] Our model also makes sense of the idea that the salience of particular issues is affected by the amount of media coverage.

The remainder of the paper is organized as follows. The next section lays out a theoretical structure through which to view the results. Section three provides institutional background for our empirical test. Section four describes the data and methodology employed for empirical testing of the central tenets of the theoretical model. Section five presents results and section six concludes.

2 The Model

2.1 The Economic Environment

There are N citizens and two goods; a numeraire good y and a public good g. Citizens are endowed with the numeraire which can be used to produce the other good. The public good is produced by a competitive production sector with a linear technology where 1 unit of the numeraire is required to produce one unit of the public good. Government and citizens make consumption decisions over two time periods.

Citizens have differing tastes for the public good. There are two preference types indexed by $k \in \{L, R\}$ where L denotes "left wing" and R "right wing". Citizens also differ in terms of their vulnerability to a shock to their consumption. We assume that this occurs with probability β, is observable by everyone and perfectly correlated across the vulnerable group. Let $j \in \{v, n\}$ denote this type where v stands for

[2] See Stromberg [1998] for a key exception.

[3] See, for example, Brians and Wattenberg [1996] and Mondak [1995].

"vulnerable" and n for "non-vulnerable". The per-period utility function of a citizen of preference type (k, j) is $y - f_j \delta_t + \phi(g; k)$ where $\phi(\cdot; k)$ is increasing, twice continuously differentiable and strictly concave. The variable $\delta_t = 1$ if the endowment shock occurs in period t and is zero otherwise, and f_j is the size of the endowment shock with $f_v > f_n = 0$. Left-wingers have a higher marginal willingness to pay for public goods in the sense that $\partial\phi(g; L)/\partial g > \partial\phi(g; R)/\partial g$ for all $g \geq 0$. Moreover, $\partial\phi(0; R)/\partial g > g/N$ so every citizen demands a positive level of public spending. There is no discounting.

The fraction of citizens of type (k, j) is denoted γ_j^k. We let $\gamma^k = \gamma_n^k + \gamma_v^k$ denote the fraction of the population with public good preference k and $\gamma_j = \gamma_j^L + \gamma_j^R$ the fraction with shock vulnerability j. We assume throughout that there are enough vulnerable types such that $\gamma_v^k > \left|\gamma^L - \gamma^R\right|$ for $k \in \{L, R\}$. This also requires that there be real political competition with relative fractions of left- and right-wing citizens not being too far apart.

2.2 Government policies

The government has two roles: providing the public good and protecting the vulnerable. The public good costs 1 and government provision is financed by a head tax. Let $b(g, k) = \phi(g; k) - g/N$ denote the surplus that a citizen of preference type k enjoys when g units of the public good are provided and $g^*(k)$ denote his preferred level of provision. Our assumptions imply that right-wingers prefer less public spending than left-wingers ($g^*(R) < g^*(L)$). For each type of citizen k, let the gain from achieving their preferred level of the public good be $\Delta b(k) = b(g^*(k), k) - b(g^*(-k), k)$. We make the following simplifying assumption that $\Delta b(R) = \Delta b(L) = \lambda$. Thus λ is measure of ideological polarization on the public spending issue.

The government can act to protect the vulnerable citizens from the endowment shock. For simplicity, we assume that there are only two policies: protection ($\chi = 1$) and non-protection ($\chi = 0$). If the government chooses protection, we assume that this completely neutralizes the effect of the endowment shock for all of the vulnerable citizens. We assume that the entire cost of protecting the citizens is borne by the policy maker.[4] There are two possible cost levels of protection: high (c_L) and low (c_H) with $c_L < c_H$. We assume that $c_H > \lambda > c_L$. This cost is drawn at random when the shock occurs and is observed privately by the policy maker. Let ρ be the probability that the cost is c_L and let z_t ($\in \{c_L, c_H\}$) denote the realized cost in period t. The gain for a vulnerable citizen from having $\chi = 1$ is just f_j.

[4]This is best thought of as being an effort rather than a financial cost – the latter falling on all citizens. The analysis would be unaltered if we added the financial cost explicitly provided that it was small.

2.3 Policy determination

There are two parties, denoted A and B, that put up candidates for public office. Each party is comprised of member citizens bound together by their views about public spending. Thus, all members of Party A are left-wingers and all members of Party B are right-wingers. We make the extreme assumption that none of the party members are vulnerable and that candidates are confined to being party members. We discuss the implications of relaxing this below. Parties determine the identity of their candidate via majority voting. We assume that candidates can commit to policies ahead of time. Hence a candidate of type k $(\in \{L, R\})$ will always deliver a public spending level $g^*(k)$. The policy decision on the protection issue is more complex as we shall see below.

There are two types of policy makers, differentiated according to their motivation to respond to the wishes of their fellow citizens.[5] This type is denoted by $i \in \{G, B\}$ where G stands for "good" and B for "bad". Information about a candidate's type is private information. A good policy maker will always implement the protection policy regardless of the cost. A bad policy maker will respond only if it is in his interest to do so. The probability that a randomly selected citizen will be a good policy maker is p.

There are two types of voters. A fraction μ are *rational voters* who anticipate the policy outcomes each candidate would deliver and vote for the candidate whose election would produce their highest policy payoff given the behavior of other voters. If they are indifferent between the two candidates, a rational voter abstains. The remaining fraction of voters are *noise voters*. In each election, a fraction η of these vote for Party A's candidate. Here, η is the realization of a random variable with support $[0, 1]$ and cumulative distribution function $H(\eta)$. The idea is that noise voters respond to non-policy relevant features of candidates such as their looks, sense of humor, etc. We assume that H is symmetric so that for all η, $H(\eta) = 1 - H(1-\eta)$. This implies that noise voters are *unbiased* in the sense that the probability that a fraction less than η vote for Party A's candidate equals the probability that a fraction less than η vote for Party B's candidate.

Noise voters make the election outcomes probabilistic. To illustrate, consider an election in which the difference between the fraction voting for Party A and Party B is ω. Since μ is the fraction of rational voters and η the fraction of noise voters who vote for Party A's candidate, Party A's candidate will win if $\mu\omega + (1-\mu)\eta > (1-\mu)(1-\eta)$ or, equivalently, if $\eta > \frac{-\mu\omega}{2(1-\mu)} + \frac{1}{2}$. The probability that Party A's candidate will win is thus $\psi(\omega)$ where $\psi(\omega) = 0$ if $\omega \leq \frac{-(1-\mu)}{\mu}$, $\psi(\omega) = 1$ if $\omega \geq \frac{1-\mu}{\mu}$, and $\psi(\omega) = 1 - H(\frac{-\mu\omega}{2(1-\mu)} + \frac{1}{2})$ otherwise. We assume throughout that $\left|\gamma^L - \gamma^R\right| < \frac{1-\mu}{\mu}$. This avoids the uninteresting case where one party has a large enough advantage to be guaranteed to win all the time.

[5] This can be thought of as a latent characteristic of citizens which is only relevant when they are in office.

The timing of the policy process is as follows:

1. Parties choose their period one candidates.
2. Voters choose the period one incumbent.
3. Period one shock (δ_1) and cost of action (z_1) determined.
4. The winning candidate chooses period one policy.
5. Parties choose their period two candidates.
6. Voters choose the period two incumbent.
7. Period two shock (δ_2) and cost of action (z_2) determined.
8. The winning candidate chooses period two policy.

Parties are assumed to correctly calculate the election probabilities associated with different candidate pairs and take them into account when choosing candidates. Any election gives rise to a *game* between the two parties. Each party's *strategy* is the type of candidate it selects and its *strategy set* is the set of possible citizen types. Each party's *payoff* from any strategy pair is determined by the probability its candidate wins and its objective function. An *equilibrium* of the game in any time period is a pair of candidate choices, one for each party, that are mutual best responses. Any equilibrium pair of candidates gives rise to a probability distribution over outcomes: the policy outcome will be that associated with Party J's candidate with a probability equal to the chance that Party J's candidate wins.

3 Analysis

We solve the model backwards, beginning with the period two policy choice. The period two policy choice can be characterized straightforwardly. Let $\sigma_{tk}(z_1; i) \in \{0, 1\}$ denote the period one protection strategy of an incumbent of type k ($k \in \{L, R\}$) in period t as a function of the cost of acting, z_1 ($\in \{c_L, c_H\}$), and their policy making type i ($\in \{G, B\}$). Only good incumbents are responsive to the vulnerable in period two if the latter face a shock. Hence, of $\delta_2 = 1$, the policy is

$$\sigma_{2k}(z_1; i) = \begin{cases} 1 & \text{if } i = G \\ 0 & \text{if } i = B. \end{cases} \quad \text{for all } z_1 \in \{c_L, c_H\} \text{ and } k \in \{L, R\}.$$

Let g_{tk} be the public goods policy chosen by an incumbent of type k in period t. In period two, $g_{2k} = g^*(k)$.

We now consider period two voting given a pair of candidates. The candidate of party J is parametrized by a pair of characteristics $\{k_J, q_J\}$ where k_J is the candidate's

ideology and q_J is the candidate's "reputation", i.e., the probability that the candidate is good. For a candidate who has not previously been in office, it is clear that $q_k = p$. However, for an incumbent, we can have $q_k \neq p$ if their period one actions have revealed information about their type.

Now consider the decision problem of a rational voter. This depends upon how much that voter weights public spending relative to protecting the vulnerable. We assume that $\beta f_v > \lambda$. This says that a vulnerable citizen gets a large enough expected benefit from protection by government relative to his ideological position on public spending. In the language of Besley and Coate (2000), this says that social protection for the vulnerable group is politically *salient* if there was contest between a known good and a known bad candidate in period two.[6] However, whether a rational voter will switch his voting position on the basis of this depends upon whether the candidates diverge in the likelihood that they are good, and hence responsive to any future shock.

Let $\Omega = q_A - q_B$ be the reputational advantage of the party A and let $\widetilde{\Omega} = \lambda/\beta f_v$. Then the informed vulnerable voters will support the candidate with the best reputation for responsiveness if $|\Omega| > \widetilde{\Omega}$.

We are now in a position to characterize the voting outcome in period two. There are three cases to consider. First, if $|\Omega| \leq \widetilde{\Omega}$, then rational voters prefer to support the candidates of their own public spending preference. In this case, the probability that party A wins is $\psi\left(\gamma^L - \gamma^R\right)$. If $\Omega > \widetilde{\Omega}$, then all of the informed vulnerable voters vote for party A and the probability that party A wins is $\psi\left(\gamma^L + \gamma_v^R - \gamma_n^R\right)$. If $-\Omega > \widetilde{\Omega}$ all of the vulnerable voters vote for B and party A wins with probability $\psi\left(\gamma_n^L - \gamma^R - \gamma_v^L\right)$.

We now consider the decision of the parties to select candidates at the end of period one (stage 5 above). There is a potential asymmetry created by the fact that one party represents the incumbent who has a reputation. Since all the party members are homogeneous, we assume that they care about selecting the candidate who gives them the largest expected payoff in period two. There are two main cases. If $|\Omega| \leq \widetilde{\Omega}$, the party members are indifferent between all the party members as candidates. We assume that in this case, the party does not re-select the incumbent. We will comment on the force of this assumption below. In the case where $|\Omega| > \widetilde{\Omega}$, there is a strict advantage from reselecting the incumbent – he will have a higher chance of winning than a randomly selected party member.

Turning now to stage 4, we can characterize the period one policy outcome. This depends upon how the rational voters will update their views about incumbents based on their period one policy choices. We assume that they do so using Bayes rule. Let $q_k(\chi, \delta_t)$ denote the probability that a candidate of ideology k is good as a function of their period one decision to help the vulnerable group and whether the shock occurred. It is clear that $q_k(\chi, 0) = p$. It is also obvious that if there is a shock

[6] The idea of politically salient issues is a central idea in political science.

and the incumbent did not respond, then he must be bad. So $q_k(0,1) = 0$ and the incumbent is replaced at stage 5. If he protects the vulnerable group, then

$$q_k(1,1) = \frac{p}{p + \sigma_{1k}(1-p)}.$$

The reputational gain from being responsive in period one is therefore

$$p\left[\frac{(1-p)(1-\sigma_{1k})}{p + \sigma_{1k}(1-p)}\right]$$

This is largest when good incumbents are rare and there is low chance that the bad incumbent will be responsive. Note that, if bad incumbents are always responsive ($\sigma_{1k} = 1$), then they are unable to build a reputation.[7] Define $\widetilde{\alpha}\,(\in [0,1])$ from

$$p\left[\frac{(1-p)(1-\widetilde{\alpha})}{p + \widetilde{\alpha}(1-p)}\right] = \widetilde{\Omega}.$$

This exists if $\lambda/\beta f_v < (1-p)$ or if the probability of there being a good incumbent is sufficiently low.

To describe the period policy equilibrium, it is useful to define:

$$\Gamma_k(\theta) = \begin{cases} \psi\left(\gamma^L - \gamma^R + \theta\right) - \psi\left(\gamma^L - \gamma^R\right) & \text{if } k = L \\ \psi\left(\gamma^L - \gamma^R\right) - \psi\left(\gamma^L - \gamma^R - \theta\right) & \text{if } k = H \end{cases}$$

as the gain in the probability of being re-elected from attracting an extra fraction θ of voters. It is straightforward to show that $\Gamma_k(\cdot)$ is an increasing function. We now have

Proposition 1 *Assume that $\lambda/\beta f_v < (1-p)$ and that $\delta_1 = 1$. Then an incumbent of type k will choose $g_{1k} = g^*(k)$. For a good incumbent $\sigma_{1k}(c_s, G) = 1$ for $s \in \{L, H\}$ and $k \in \{L, R\}$. If the incumbent is bad, then*

(i) if $\Gamma_k\left(\gamma_v^{-k}\right)\lambda > c_L$ and $\rho < \widetilde{\alpha}$, then

$$\sigma_{1k}(c_H, B) = 0 \text{ and } \sigma_{1k}(c_L, B) = 1$$

and

(iii) for all other parameter values: $\sigma_{k1}(c_H, B) = \sigma_{k1}(c_L, B) = 0$.

This result embodies some of the key insights about government responsiveness in our model. For a bad incumbent to be responsive, it has to be that their reputation building incentive is great enough. This depends on two things: the degree to which being responsive raises their re-election chances (represented by $\Gamma_k(\cdot)$) and the extent

[7] This would not be the case if we supposed that incumbents with no-reputatational advantage were re-elected.

to which they value re-election represented by λ. If these are not high enough to offset the costs when the cost of acting is low ($s = L$), then there is no chance that reputation building will serve to make the government responsive. Our assumption that $\rho f_v > \lambda$ is critical since it guarantees that protection is a politically salient issue for the vulnerable citizen-voters. The condition that $\rho < \widetilde{\alpha}_k$, reflects the requirement that being responsive a fraction ρ of the time (when the cost is low) yields a sufficient increase in reputation to persuade the vulnerable voters who support the alternative public spending ideology to vote in your favor.

Before turning to the implications of the model, we complete the analysis of the remaining stages of the game. The result in Proposition 1 is relevant if there is a period one shock. Otherwise, the only government policy is provision of the public good. In either case, since whether an incumbent is good or bad is private information, voters will vote in period one on candidates solely according to their left-right identities. Hence, the probability that party A wins is $\psi\left(\gamma^L - \gamma^R\right)$ and party B wins with probability $\left(1 - \psi\left(\gamma^L - \gamma^R\right)\right)$. Party members are indifferent between all of the potential candidates who share their view about public spending and hence select a party member at random.

The output of the model is a probability distribution over period one policy according to the outcome of the election in each period, the structure of shocks and the probability that good and bad incumbents are selected.

The assumption that there are no vulnerable citizens in the party could be relaxed. There would then be a decision by the party members of whether to put up a vulnerable citizen in the election. We assumed that party members choose to try out a new incumbent if they are indifferent between electing and not re-electing the incumbent.

The only thing motivating the policy maker is the ideological benefit from holding office. If $\lambda = 0$, then bad citizens will never be responsive in this model. In line with earlier treatments of political agency problems, we could introduce some kind of private benefits to holding office. This would, of course, increase the incentives for period one reputation building.[8]

3.1 Implications

The model that we laid out will provide a useful foundation for thinking about the conceptual link between government responsiveness and the role of the media. The latter will appear in the model in a highly reduced form way – by affecting the number of rational and noise voters. Hence, we will consider situations of low noise voting as commensurate with high media development. Clearly, a more complete treatment

[8] Things become more complicated if office holding rents are large enough so that the payoff to holding office (ideology plus rents) exceeds c_H. To analyze this case, requires the introduction mixed strategies in voting and involves the incumbent being responsive when the cost of doing so is c_H.

that looks for an endogenous motive for media development, is desirable. However, our first pass will serve to underpin the policy discussion.

For the empirical analysis reported below, we are interested in seeing how having a larger informed set of voters changes incentives for government responsiveness. In terms of our model, this a comparative static exercise with respect to μ. Proposition 1 implies that, in every case, the probability of having a responsive bad policy maker is increased when (i) the value of holding office represented by λ increases and (ii) the electoral gain from being responsive increases. This can be seen by examining cases (i) and (ii) from the Proposition above. The former is determined by ideological divergence and any rents from holding office. The second is determined by the underlying fraction of noise voters and the distribution of rational voter tastes.

We now show how creating a larger group of rational voters can increase government responsiveness.

Proposition 2 *(i) For small enough μ, then in any equilibrium, the government does not protect the vulnerable citizens in period one (ii) If $\left|\gamma^L - \gamma^R\right|$ is small enough, $\rho > \widetilde{\alpha}$ and $\frac{\lambda}{2} > c_L$, there is a critical fraction of informed voters, $\overline{\mu}$, above which an equilibrium exists with $\sigma_{1k}(c_H, B) = 0$ and $\sigma_{1k}(c_L, B) = 1$.*

Part (i) of this result says that having an equilibrium where politicians are willing to build a reputation does rest on there being enough voters who vote rationally. The second part gives some sufficient conditions for there to be a threshold fraction of rational voters such that an equilibrium exists where bad incumbents are responsive in period one.

A key assumption behind this result is that $\left|\gamma^L - \gamma^R\right|$ be small enough. This can be interpreted as saying that political competition between the parties has to be intense enough. Thus, our model delivers the result that a more competitive political environment implies a government that is more responsive (see, for example, Holbrook and VanDunk (1993)).

The result does not say that the level of responsiveness is necessarily monotonic in μ. However, there are examples where this is the case. For example if $H(\cdot)$ is uniform distribution, then

$$\Gamma_L\left(\gamma_v^R\right) = \begin{cases} \frac{1}{2}\left[\frac{\mu}{1-\mu}\right]\gamma_v^R & \text{for all } \mu \leq \frac{1}{\gamma^L - \gamma^H + \gamma_v^R + 1} \\ \frac{1}{2} + \left[\frac{\mu}{1-\mu}\right]\frac{1}{2}\left(\gamma^L - \gamma^R\right) & \text{otherwise.} \end{cases}$$

and

$$\Gamma_R\left(\gamma_v^L\right) = \begin{cases} \frac{1}{2}\left[\frac{\mu}{1-\mu}\right]\gamma_v^L & \text{for all } \mu \leq \frac{1}{\gamma^R - \gamma^L + \gamma_v^L + 1} \\ \frac{1}{2} + \left[\frac{\mu}{1-\mu}\right]\frac{1}{2}\left(\gamma^R - \gamma^L\right) & \text{otherwise.} \end{cases}$$

In both of these cases, the gain from being responsive is increasing in μ.

The model can also be used to address the link between polarization and government responsiveness. It is easy to see that there are two effects which make this

ambiguous *a priori*. The first effect operates through voting. An increase in ideological divergence raises $\widetilde{\Omega}$, implying that the reputational difference between the candidates has to be much larger for the voters to be willing to eschew voting on ideological grounds. This weakens the incentives for reputation building. The second effect comes from the fact that λ affects the value from holding office. A polarized polity thus gives the incumbent an extra incentive to build a reputation. In the case where there are private rents to holding office that already guarantee that we are in case (i) above, then the effect of polarization would be too weaken the possibilities for reputation building.

4 Institutional Context

We now move to empirical testing of the hypothesis that more informed populations, as proxied by newspaper circulation, are more effective at eliciting responses by the government following shocks to vulnerable groups. Our analysis is divided into three parts. In the first, we examine how a free press has developed in India and what role this has had in galvanizing support for public action during crisis periods. In the second we describe the data set we are using and out our econometric strategy. In the third we report the results of our empirical test.

4.1 Media in India

Figure 1 graphs out total newspaper circulation per capita for each of the sixteen main Indian states for the period 1958 to 1992. In the bulk of the states newspaper circulation per capita has been rising over time. However, what is even more notable is the fact that the levels and changes in newspaper circulation per capita are very different across different states. Circulation in Kerala is both highest and has grown most quickly across the period. Circulation levels are also relatively higher in progressive states such as Tamil Nadu, Maharashtra, Karnataka, Punjab and West Bengal whereas they are low in backwards in states such as Bihar, Uttar Pradesh, Orissa, Madhya Pradesh and Rajasthan giving the impression that media development is linked to social development. We will exploit these differences in newspaper circulation across states and time in the paper to examine what impact access to media has on government responsiveness.

As has been pointed out by Sen (1981, 1984), Dreze and Sen (1989, 1995) and Ram (1991) India is distinguished from the bulk of other low income countries in having a relatively free and active press. Ram (1991: 188) underlines this point by stating that "the Indian press is widely regarded as the most pluralistic, the least inhibited and the most assertive or independent in all the Third World". The freedom of the Indian press is central to its ability to elicit timely and effective government responses following natural shocks such as droughts and famines. Ram (1991: 186) describes the role of the press in averting crisis during these situations: "Over time,

it has tended to bring out the facts in the field with elements of vivid descriptive and human interest detail; and to expose the failure of government authorities to recognize the problem, its causes and early symptoms, and to respond quickly and adequately in terms of crisis prevention, management, and relief."

One way to look at the issue of plurality and independence of the Indian press is to look at ownership structure. Table 1 gives a breakdown of who owns newspaper and periodical titles in India. It turns out that only a very small fraction (roughly 2%) of titles are owned directly by central or state government. Ownership of the rest is spread across a variety of owners who are quasi-independent from the state with the bulk of titles (roughly 70%) being owned by private individuals. With an ownership structure as independent and plural as this it is perhaps not surprising that the press in India plays a central role in highlighting government failure to respond to crisis situations.

The freedom of the press in India is in strict contrast to other forms of media in India such as radio and television which for the bulk of the period 1960 to 1992 have been under strict government control. Ram (1991: 189) notes that the pluralism and independence of the press is "in strict contrast to the regressive monotony of the and the narrowly construed propagandistic tone of state-owned and state-regimented television and radio". For this reason, in this paper, we focus mainly on the role of printed press in forcing state governments to respond to crises.

4.2 Government Responsiveness

The states of India has always been prone to a number of shocks which threaten livelihoods which include droughts, floods, earthquakes and cyclones. Droughts and floods are the most frequent of these shocks, affect the largest numbers and represent a significant source of insecurity. Whether access to media makes state governments more responsive to these shocks is the question that will be dealt with in this paper.

For a large part of its history the state in India has limited success in dealing with these crises and the failure to do so has often resulted in the death of millions (see Sen, 1981; Dreze 1991; Dreze and Sen, 1989). In India the development of policies to deal with natural calamities is closely intertwined with famine prevention. Though famine relief has a long history[9], Dreze (1991) points out that the emergence of a coherent and effective strategy to deal with the threat of famine is relatively recent.

Frequent and severe famines during both the 18th and 19th centuries were a major source of concern to the British Administration which came to power in 1858. This led to the setting up of Famine Commissions, most notably that of 1880, to devise effective measures for the prevention of famines. The Famine Commission

[9] A treatise ascribed to Kautilya written over two thousand years ago recommends that "when famine threatens the king should "insitute the building of forts or water-works with the grant of food, or share (his) provisions (with them), or entrust the country (to another king). (Cited by Dreze (1991)).

Report of 1880 recommended the promulgation of Famine Codes that would contain authoritative guidelines to local administration for the anticipation, recognition and relief of famines. The Famine Codes emphasized the need for local administrators to look for signs, such as large drops in food production and increases in food prices, which signal an impending crisis and then to respond quickly to prevent the onset of famine. Following a period of experimentation the 1858 to 1880 period[10], the British Administration settled on a two-pronged strategy: (i) the organization of massive public works and (ii) the provision of gratuitous relief to those incapable of work as being the key means of responding to the threat of famine (Dreze, 1991). This strategy set out in the Famine Codes which were widely disseminated to local administrators still constitute the backbone of calamity relief policy in India.

The Famine Commission Report of 1880 represented a turning point in the history of calamity relief in India. For the first time there was effective nationwide strategy for dealing with the threat of famines and other natural calamities. As Dreze (1991) points out such was the success of this strategy that the history of famine prevention in India may be divided into the a pre-1880 period characterized by frequent and severe famines and a post-1880 period where there were few famines.[11] The period of relatively stability between 1880 and Independence in 1947, however, was punctuated by famines in 1896-1897 and 1899-1900 and by the great Bengal famine of 1943. Analysis of why the relief system failed to prevent these crises points to a few key challenges which were taken up in the post-Independence era. First, there was recognition that existence of the Famine Codes did not ensure their effective application. Triggering mechanisms are necessary to ensure the energetic and early implementation of relief measures. The seminal analysis of the Bengal Famine of 1943 by Sen (1981) pointed to how political factors led to the Famine Codes being deliberately ignored. The lack of democratic political institutions and of a free and independent press have also been identified as factors which explain why relief measures were not triggered (see Sen, 1981; Ram, 1991). Second, the unwillingness of the British to intervene in food markets to ensure adequate entitlements to food was identified as a root cause of the post-1880 famines (Sen, 1981; Dreze, 1991). As Sen (1981) points out for the case of the Bengal Famine of 1943, adequate food availability for India as a whole was not sufficient to prevent starvation deaths of between 1.5 and 4 million people. The lack of a large stock of food in the public distribution system has been identified as a factor both behind the unwillingness of the British authorities to declare a famine (and hence trigger the Famine Codes) and of their inability to break the speculative price spiral which occurred during the Bengal famine (Sen 1981:

[10] Which was charecterised by various failures to prevent famine such as in the case of the 1860-61 period.

[11] The reduction of the incidence of famines during the latter half of British rule should not be entirely attributed to the policies set out in the Famine Codes. The development and extension of communication (particularly railways) and irrigation networks also played a central role (see Dreze, 1991).

79).[12]

Following Independence there were two key developments which helped to remedy these deficiencies in the calamity relief system. The introduction of a democratic system of government and the holding of state and central elections meant that the government was more accountable to the citizenry. Relatedly, development and extension of a free and independent press helped to ensure that government was responsive to shocks such as droughts and floods. As is clear from Figure 1 the level of media penetration was varied across states and times and this variation will be exploited in our econometric analysis to check whether it had a role in heightening government responsiveness to natural shocks as is predicted by the model. The second major development related to a massive expansion in the public distribution system which involved large-scale government involvement in the procurement, storage, transportation and distribution of foodgrains. Though this system has been inadequate to the challenge of reducing mass-poverty in India its role in preventing famines is well recognized (see Dreze, 1991).

5 Data and Methodology

To test the hypothesis that more informed populations elicit a greater response by the government to drought and floods we need three types of information. (i) Proxies of the severity of drought and flood shocks (s_{st}) which can also be interpreted as a measure of the need for government intervention. For these we used foodgrain production per capita as an indicator of the severity of a drought shock and the value of flood crop damage as an indicator of the severity of a flood shock. (ii) A measure of the government responses to deal with these shocks (g_{st}). We used the total amount of foodgrains per capita distributed via the public distribution system as the drought response variable. Real state government expenditure per capita was used as the flood response variable. (iii) Media development variables (m_{st}) which capture how informed the population in a given state are. Our key proxy of media development is newspaper circulation both in aggregate and broken down by language of circulation. See the Data Appendix for detail on the construction and sources of these variables.

Table 2 provides means and standard deviations of the main variables used in the paper. These are averaged for the 1958-1992 period and are arrayed by state. What is clear is that there is an enormous amount of variation across the Indian state in terms of government responses, the severity of shocks and media penetration. Public distribution of food per capita, for example, varies seven fold between Madhya Pradesh (low) and Kerala (high). Calamity relief expenditure never constitutes much more than half a percentage point of total state GDP but nonetheless exhibits

[12] These deficiencies were recognised in the Famine Inquiry Commission of 1945 which led to calls for the development of an integrated food policy for India involving large scale procurement and distribution across the Indian states.

pronounced variation ranging from 0.58 % in Orissa, which is particularly prone to natural disasters, to 0.16 % in Tamil Nadu. The third and fourth columns also indicate that there is pronounced variation both in foodgrain production per capita and in the value of crop damage from floods. To better capture the notion of shocks in the data we have also graphed out these variables as deviations from (state specific) means for each of the states. These results are shown in Figures 2 and 3 and make it clear that certain states are drought prone in terms of experiencing large fluctuations in food grain productions per capita whereas others are flood prone in terms of regularly experiencing significant flood related crop damage. Table 2 also makes it clear that level of newspaper circulation, polarization as proxied by the share of scheduled caste/scheduled tribe and gini and literacy also vary widely across Indian states. We want to exploit this variation in the econometric analysis to test whether media development and polarization affect government responsiveness.

We run regressions of the following form to test the key predictions of the model:

$$g_{st} = \alpha_s + \beta_t + \delta s_{st} + \gamma(s_{st})(m_{st}) + \phi m_{st} + \theta z_{st} + u_{st} \tag{1}$$

where α_s and β_t capture state and year fixed effects and z_{st} is a vector of control variables which are intended to capture factors such state domestic income, level of urbanization and population intensity which might be expected to affect government responsiveness (g_{st}). The key coefficient of interest is γ on the interaction term between the drought or flood shock (s_{st}) and newspaper circulation (m_{st}). This will indicate whether state governments are more responsive to these shocks when there is a higher degree of media penetration.

While, in principle, any policy can be responsive to media activity, the policies that we are studying here have several features that make them interesting as a testing ground for the ideas set out in the theoretical model. First, they are based on responsiveness to a specific shock which has large exogenous component due to vagaries of climate. This implies that the estimate of γ above could more plausibly be a response to an exogenous event. This contrasts with estimates of ϕ, the level effect of media development – there are more reasons to suspect correlation between m_{st} and u_{st}. We will return to this below. Another advantage with focusing on estimates of γ in this context comes from the fact that this is based on a clear set of administrative guidelines on how state governments should respond when they experience climatic shocks. Thus, we have reason to expect that the effect of media development would be experienced here. The key test that we focus on, therefore, is whether $\gamma > 0$ in equation (1).

6 Results

6.1 Basic Results

In our model, media development drives up the fraction μ of rational voters in the population. This leads to a reduction in noise voting and strengthens incentives for state politicians to respond to natural shocks such as droughts and floods. We would therefore expect government responsiveness to a shock to be greater in states where media is most developed.

Table 3 presents the basic set of results. Two types of responses are considered, public food distribution and calamity relief expenditures. We begin by checking how these responses are affected by different shock variables. Column (1) indicates that public food distribution responds to drops in food grain production but not to crop damage indicating it is mainly a drought response variable. Column (4) indicates that calamity relief expenditures respond to crop damage but not to drops in food grain production indicating that it is mainly a flood response variable. We thus have two response–shock systems that we want to analyze, food distribution–food production and calamity relief–flood damage, dividing the table into two panels.

In columns (2) and (5) we run equation (1) to test the central prediction from the theory that media development encourages government responsiveness. In column (2) we see that the γ coefficient on the interaction term between food production and newspaper circulation is negative and significant. This tells us that for a given fall in food production having greater newspaper circulation leads to greater public distribution of food. The coefficient on newspaper circulation, which also appears linearly in the regression is positive and significant, indicating that it may have a role in expanding public distribution of food for reasons other than as a response to food shocks.[13] Column (5) reports the same set of results for calamity relief expenditure. The coefficient on the interaction term between crop damage and newspaper circulation is positive and significant. This tells that for a given amount of crop damage having greater newspaper circulation in the state leads to significantly higher spending on calamity relief efforts.

The sets of results from columns (2) and (5) are directly in line with what we would expect from the theory if media development reduces noise voting and increases incentives for politicians to respond to climatic shocks. There is a clear symmetry between the results presented in columns (2) and (5). This is striking because they deal with distinct types of government policy responses to distinct types of shocks and the data on both the responses and the shocks comes from completely different sources (see Data Appendix). The results in columns (2) and (5) thus strongly suggest that the media has a role in making government more responsive to policy issues. A

[13] Operation of the Public Distribution System spans both shock and non-shock periods. What changes in shock periods is that the volume of food grains being channeled through the system increases dramatically.

potential role for the media in affecting policy choices has been recognized in past work. There has, however, been very limited empirical analysis of this issue. The results in columns (2) and (5) of Table 3 provide the empirical confirmation of media development making governments more responsive.

To give some idea of the magnitudes involved we find that a 10 % drop is associated with a 1 % increase in public food distribution in state which are at the median in terms of newspaper circulation per capita. However, for states that are in the 75 % percentile in terms of newspaper circulation per capita we find that a 10 % drop in food production is associated with a 2.28 % increase in public food distribution. This simple calculation illustrates how press development can enhance the responsiveness of Indian state governments to natural shocks.

One worry about the results presented in columns (2) and (5) is that we are not controlling for other factors which may be driving state government policy responses. In columns (3) and (6) we therefore include three variables which may have some bearing on the *ability* of state governments to respond; log state income per capita, population density and degree of urbanization. These capture a mixture of funding and implementation constraints. If these are excluded from the regression but are correlated with media development then they could be biasing the results. The pattern of results observed in columns (2) and (5) is robust to the inclusion of these controls . This increases our confidence that it is media development that is driving the results and not some omitted factor.

6.2 Polarization and Responsiveness

Another key insight from the theory is that the degree of polarization of the electorate may have an impact on government responsiveness. This can happen via two distinct channels. First, an increase in ideological divergence implies that the reputational difference between candidates has to be greater to convince citizens not to vote on ideological grounds. This will weaken incentives for reputation building. Second, with a more polarized polity the ideological benefit from holding office λ is enhanced which gives incumbent an extra incentive to build a reputation. The overall impact of polarization on responsiveness is thus ambiguous *a priori*.

India is an interesting setting in which to examine this issue as polarization along such dimensions as caste and income varies strongly both across states and time. We use two measures to capture polarization in a given state and year: (i) proportion of people categorized as scheduled caste or scheduled tribe (SC/ST) in the total

population[14], (ii) gini coefficient for consumption expenditure[15]. To test whether or not polarization increases or reduces responsiveness of state governments to natural shocks we interact these variables with our shock variables and include these in equation (1). The results are shown in Table 4. In column (1) and (4) we introduce the polarization measures linearly. Having a higher fraction of SC/ST in the population has no impact on food distribution but tends to reduce calamity expenditure whereas having a higher gini tends to increase food distribution and (to a lesser extent) calamity expenditures.[16]

We then introduce the interacted terms in columns (2) and (5). In column (2) we observe that as food production drops having a higher proportion of SC/ST in the population or having a higher gini coefficient tends to reduce government responsiveness in the form of public distribution of food. In column (5) we observe that for a given level of crop damage from floods having either higher share of SC/ST in the population or a higher gini tends to reduce calamity relief expenditure. In columns (3) and (6) we introduce controls for state GDP, degree of urbanization and population density and these results remain robust.[17]

These results strongly suggest that having a society which is more unequal or fragmented along caste or tribal lines tends to reduce government responsiveness to droughts and floods. This may be because in a more polarized society the ideological divergence between candidates is larger and this increases the tendency to vote on ideological grounds thus weakening incentives for reputation building. This is consistent with evidence that voting in India has traditionally been done along caste (high caste, SC/ST), party (Congress, non-Congress) or family (Ghandhi, non-Ghandhi) lines. In this situation there will be less swing voters and the incentive for a candidate to build a reputation by responding to crises is weakened. This evidence also resonates with a growing literature which suggests that polarization along ethnic or income dimensions tends to weaken collective action and lower economic performance.[18]

Columns (2), (3) and (5), (6) in Table 4 also contain interaction terms between newspaper circulation and shocks which were the focus in Table 3. These remain

[14]The Hindu caste system assigns every individual to a caste and each caste occupies a determinate position in a hierarchical scale of ranks. Between two to three thousand castes exist, of which 779 of the most socially disadvantaged castes are identified by the Government of India as scheduled castes. Scheduled tribe refers to members of India's indigenous tribal population. In the 1991 census about 25% of population is identified as scheduled caste or scheduled tribe of which about two thirds is made up of scheduled caste (Pande, 1999).

[15]Gini coefficients are calculated from the National Sample Survey Socioeconomic Surveys which have been carried out on a continuous basis during the 1958-1992 period (see Ozler, Datt and Ravallion, 1996).

[16]This latter result might be explained by the fact that the need for public food distribution may greater in more unequal societies.

[17]With the exception of the coefficient on the interaction term between SC/ST population and the food shock which becomes insignficant.

[18]See, for example, Alesina, Baqir and Easterly [1999], Miguel, [1999], la Ferrara, [1999] and Narayan and Pritchett [1998].

largely significant. This suggests on the one hand that access to news media tends to heighten government responsiveness to natural shocks and on the other that polarization tends to dampen responsiveness.

6.3 Publication Language and Responsiveness

India is a linguistically diverse country and the large array of languages in which newspapers are published is symptomatic of this. It is quite possible that newspapers published in certain languages are more effective in informing potential voters and eliciting government responsiveness. We, therefore, supplemented our data set with information on newspaper circulation by language. This enables us to see whether the publication language affects government responsiveness. Though we have information on circulation of newspapers in over twelve languages some languages are specific to certain states. We have therefore aggregated this information into three groups; English, Hindi and *other* which captures a range of regional newspapers. Given language barriers most newspapers with national circulations are published either in English or Hindi. Regional papers, however, will tend to have a stronger focus on regional issues and may play a larger role in highlighting failures of state governments to respond to local crises.

To examine this empirically we interacted our three categories of newspaper circulation with our shock variables to see whether there are differences across he groups. The results are given in Table 5. In columns (1) and (4) we examine whether language of circulation has a direct effect on responsiveness. We find that non-English, non-Hindi circulation has a large impact on public food distribution but not on calamity relief expenditure. English and Hindi circulation have no direct impact on government responsiveness. When we interact these variables with the shock variables in columns (2) and (5) we find that having higher non-Hindi, non-English circulation in a given state increases both public food distribution and calamity relief expenditure. This suggests that our basic results are being driven by newspaper circulation in regional languages. Regional presses, which may have a greater incentive to cover local issues, therefore appear to lie at the heart of why media development encourages government responsiveness. This makes sense as we are studying responses by *state* governments, in the form of public food distribution and calamity relief expenditure, to local crises. These state governments are likely to be most sensitive to what is written in local newspapers as this is typically will be what is being read by the local electorate.

6.4 Robustness Checking

6.4.1 Omitted Variables

One clear concern with the results presented so far is that the newspaper circulation variables may be proxying for variables which both drive government responsiveness

to shocks and are correlated with newspaper circulation but which are omitted from the regressions. We attempt to deal with this concern in Table 6 for public food distribution and Table 7 for calamity relief expenditure.

An obvious candidate in this regard is literacy. Literacy (like circulation) will affect the ability of citizens to absorb information about the action of politicians and hence incentives for politicians to build reputations for responding to shocks. Whilst including literacy in the basic regressions is a useful robustness check we have to keep in mind both that the figures are unreliable and that because they are patchy and only available consistently over a shorter time period there is a significant reduction in sample size.

In column (1) of Tables 6 and 7 respectively we see that whilst literacy has no direct effect on government responsiveness[19] it does increase state government responsiveness to falls in food production (but not to flood related crop damage). Interestingly we also observe that including linear and interacted literacy terms reduces the significance of the interaction term between regional newspaper circulation and food production (see column (1) of Table 6) suggesting that literacy and newspaper circulation are both proxying for whether or not voters are informed. This is consistent with observing a strong correlation between circulation and literacy variables in the data and may also be a function of the lower sample size. Increasing either literacy or newspaper circulation will both reduce noise voting and increase incentives for reputation building. Taking together these results with those in Tables 3, 4 and 5 we have an indication that increasing media penetration, reducing polarization and increasing literacy are all means of increasing government responsiveness to food production shocks. For calamity relief expenditure, literacy has no impact on government responsiveness to flood shocks, however, newspaper circulation continues to enhance government responsiveness and this result is driven mainly by regional newspaper circulation. We have also tried to include literacy in the regression by dividing newspaper circulation through by the literate population in a state as opposed to the total population and this has no significant impact on the robustness of our results. Controlling for literacy in the regressions therefore does not affect the robustness of our core results.

We might also believe that richer states may both achieve higher literacy and be more able to respond to shocks. In column (2) of Tables 6 and 7, however, we observe that the coefficients on real state domestic income per capita interacted with the shock variables are highly insignificant and their inclusion does not affect the robustness of the circulation results. In a similar vein we might believe that states with higher literacy might also have better transport infrastructures which will affect their ability to deliver relief. In column (3) of Tables 6 and 7 we include length of national highways per capita both linearly and interacted with the shock variables. As is evident from the tables these terms are both insignificant and do not affect

[19] This is confirmed if we exclude the circulation figures and regress literacy on public food distribution and calamity relief expenditure.

the robustness of our basic results. Finally in column (4) of Tables 6 and 7 we introduce dummies for whether it is a pre-election or election year to see whether state governments are more responsive to natural shocks in the run-up to an election. We find no such effects and the basic results obtained in Table 5 go through.

Controlling for literacy, state income, infrastructural development and electoral cycles in these response–shock systems therefore does not affect the robustness of the basic results on the role of media in making government more responsive to policy issues. This increases our confidence that it is indeed media development that is making state governments more responsive to natural shocks in India.

6.4.2 Endogeniety

A final remaining concern is that the newspaper circulation terms may themselves be endogenous. Unobservable factors which drive up government responsiveness may also drive up newspaper circulation. For example, a left wing government may both wish to boost newspaper circulation and respond to the needs of vulnerable sections of the population. In this situation newspaper circulation may be wrongly attributed with a role in driving government responsiveness to shocks. This concern is somewhat muted by the fact we are only concerned with government responsiveness to exogenous natural shocks. Nonetheless a concern remains. To deal with this we need to find an instrument which is correlated with newspaper circulation but has no bearing on the responsiveness of state governments to natural shocks.

Newspaper circulation in India is constrained by the availability of newsprint which is mainly imported and allocated to the states by central government under the Newsprint Allocation Policy (NAP). Newsprint was brought under the purview of the Essential Commodities Act in 1955 and its importation and allocation has been under central government control since then. Though newspapers in the states have to apply for newsprint there is excess demand and therefore newsprint allocation to the states is rationed by the central government using various rules such as quotas for maximum circulation, caps on page numbers and bans on transfer of newsprint across publications.

Given that newsprint is a planned commodity, allocation of newsprint across states is likely to affect circulation levels in the states. However because the allocation is under the strict control of central government it should not have any bearing on the degree to which state governments respond to natural shocks. Newsprint allocation is therefore potentially a good instrument for newspaper circulation. In Table 8 we experiment with instrumenting both the linear and interacted circulation terms with the quantity of newsprint allocated to different states which we have as annual series since 1966. In columns (1) and (2) we see our basic results confirmed. Higher newspaper circulation tends to increase the responsiveness of state governments to falls in food production and flood related crop damage. These results increase our confidence that it is indeed newspaper circulation that is affecting the responsiveness

of state governments to natural shocks.

7 Concluding Comments

To create incentives for politicians to build reputations we must have some means of monitoring their performance in dealing with a range of issues. For most citizens mass media is the source of such information. In this paper we develop a model where access to media affects the number of rational and noise voters between two ideological poles. Media development creates a more informed electorate and thus strengthens incentives for politicians to build reputations though such incentives may be blunted if ideological divergence between candidates is extreme. Through this mechanism we would expect responsiveness of the government to salient issues such as crisis management to be greater where the media is more developed.

We subject the central tenets of the model to empirical testing by examining how state governments in India have responded to the threat posed by droughts and floods between 1960 and 1992. We find that they have been more responsive in states with high levels of media development and low degrees of polarization. These results point to information dissemination having a central role in policy formation. This is consistent with what we would expect from the theory.

There is scope for further work that tries to link government policy to media development, especially in developing countries. In an Indian context, there may be other policies that respond to media development. More broadly, our results also underline the potential importance of media develop to an effectively functioning democracy. The formal institutions of political competition (such as open elections) are not sufficient to deliver a responsive government unless voters have the real authority to discipline poorly functioning incumbents. This requires voters to have the necessary information.

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8 Appendix: Proofs of Results:

Proof of Proposition 1: Case (i): We begin by showing that under the proposed strategy of the incumbents, a voter whose view about public spending does not coincide with incumbent's type is willing to vote in his favor. To see this, observe that conditional on the proposed strategy, the probability that an incumbent who protects the vulnerable group is good is $[p/(p+\rho(1-p))]$. Thus his reputational advantage is

$$p\left[(1-p)(1-\rho)/(p+\rho(1-p))\right].$$

The assumption that $\rho > \widetilde{\alpha}$ guarantees that the incumbent's policy making type is politically salient. Hence, a fraction γ_v^{-k} will vote for a candidate of public spending type k. It is straightforward now to check that this guarantees that party J will reselect their incumbent. We do this for the case where party A's candidate won the election in period one. The argument for party B is symmetric. The probability that party A will win the period two election is $\psi\left(\gamma^L-\gamma^R\right)$ if they select a new candidate and $\psi\left(\gamma^L-\gamma^R+\gamma_v^R\right)$. Since $\psi\left(\gamma^L-\gamma^R+\gamma_v^R\right) > \psi\left(\gamma^L-\gamma^R\right)$, this is guaranteed.

We now turn to incumbent behavior, again focusing on the case of party A (the case of party B being symmetric). The continuation payoff of the candidate of party A if he is responsive to the shock faced by the vulnerable group is:

$$\psi\left(\gamma^L-\gamma^R+\gamma_v^R\right)b\left(g^*(L),L\right)+\left[1-\psi\left(\gamma^L-\gamma^R+\gamma_v^R\right)\right]b\left(g^*(H),L\right)-c_L$$

and if he is unresponsive, it is

$$\psi\left(\gamma^L-\gamma^R\right)b\left(g^*(L),L\right)+\left[1-\psi\left(\gamma^L-\gamma^R\right)\right]b\left(g^*(H),L\right).$$

The latter is less than the former if and only if $\Gamma_L\left(\gamma_v^R\right)\lambda > c_L$ which is precisely the condition in part (i) of the Proposition. Our assumption that $\lambda < c_H$ guarantees that $\Gamma_L\left(\gamma_v^R\right)\lambda < c_H$ so it is never in the interesting of the incumbent to respond if the cost is c_H.

Case (ii): If $\Gamma_k\left(\gamma_v^{-k}\right)\lambda < c_L$, then it is clear that any type of incumbent would not respond to the vulnerable group, even if the rational voters who preferred the public spending level of the $-k$ type were willing to support it in the period two election. Now consider the case where $\Gamma_k\left(\gamma_v^{-k}\right)\lambda > c_L$, but $\rho \leq \widetilde{\alpha}$. Then even if an incumbent of type k were responsive if the cost of being so were c_L, the vulnerable citizens of type $-k$ would not vote for that incumbent. So being responsive is not an equilibrium in this case. ■

Proof of Proposition 2: Part (i): Recall that for small enough μ, $\psi(\omega) = 1 - H\left(\frac{1}{2}+\frac{1}{2}\frac{\mu}{1-\mu}\omega\right)$. Thus, it is clear that for all (ω,ω')

$$\lim_{\mu\longrightarrow 0}\left[\psi(\omega)-\psi(\omega')\right]\rightarrow 0.$$

This implies that $\lim_{\mu\to 0}\Gamma_k\left(\gamma_v^{-k}\right) \to 0$ for $k \in \{L,R\}$. Hence, for small enough μ, $\Gamma_k\left(\gamma_v^{-k}\right)\lambda < c_L$ for $k \in \{L,R\}$. Thus, referring to Proposition 1, a period one incumbent will not be responsive if a shock occurs.

Part (ii): Let $\mu' = \frac{1}{1+|\gamma^L-\gamma^R|}$. This belongs to $[0,1]$ since $\left|\gamma^L-\gamma^R\right| < \frac{1-\mu}{\mu}$. When $\mu=\mu'$, then $\psi\left(\gamma^L-\gamma^R+\gamma_v^R\right)=1$. Thus,

$$\Gamma_L\left(\gamma_v^R\right) = \left[\psi\left(\gamma^L-\gamma^R+\gamma_v^R\right)-\psi\left(\gamma^L-\gamma^R\right)\right] = 1-\psi\left(\gamma^L-\gamma^R\right).$$

Similarly,

$$\Gamma_R\left(\gamma_v^L\right) = \left[\psi\left(\gamma^R-\gamma^L+\gamma_v^L\right)-\psi\left(\gamma^R-\gamma^L\right)\right] = 1-\psi\left(\gamma^R-\gamma^L\right).$$

Now observe that for any smooth function $H(\cdot)$ $\lim_{\omega}\psi(\omega) \to \frac{1}{2}$. Now observe that $\lim_{|\gamma^R-\gamma^L|\to 0}\Gamma_k\left(\gamma_v^{-k}\right)\lambda \to \lambda/2 > c_L$. Hence case (i) of Proposition 1 applies and as long as $\rho > \widetilde{\alpha}$, there is an equilibrium where $\sigma_{1k}(c_H,B)=0$ and $\sigma_{1k}(c_L,B)=1$. By construction therefore we have proven part (ii) where $\overline{\mu} = \frac{1}{1+|\gamma^L-\gamma^R|}$. ■

9 Data Appendix

9.1 Government Response Variables

- Public Food Distribution Per Capita:
  - Issues/ public distribution of food grains (both from central and state governments) divided by (interpolated) state population
  - unit: tonnes per person
  - public distribution of food grains
    - source: Bulletin on Food Statistics, Ministry of Food and Agriculture, Directorate of Economics and Statistics
    - note: data for year 1993 provisional
  - population data
    - source: censuses 1951, 61, 71, 81 and 91, Census of India, Registrar General and Census Commissioner, Government of India
    - state populations assumed to grow at a constant (compound) rate derived from the respective population totals for interpolation
- Calamity Relief Expenditure Share In Net State Domestic Income
  - expenditure on calamity relief divided by state net domestic income
  - unit: percentage points
  - calamity expenditure:
    - Relief Expenditure on Natural Calamities under Social Expenditure in State expenditure accounts
    - source: Reserve Bank of India Bulletin, Reserve Bank of India, also available in Report on Currency and Finance (also published by the Reserve Bank of India), and the Public Finance Statistics (Ministry of Finance, Government of India)
  - net state domestic income
    - State Net Domestic Product, All Sectors
    - source: Estimates of Domestic Product, Department of Statistics, Ministry of Planning

9.2 Mortality Variable

- number of infant mortality rates per 1000 live births
- source: Health Statistics/Information of India, Pocket Book of Health Statistics, SA Health Data
- assumed to grow at a constant (compound) rate derived from the respective population totals for interpolation (original gaps: 1971-80 for states 3 & 21, 1971-75 for others, 1983-84 for all)

9.3 Shock Variables

- Total Food Grain Production Per Capita
  - total food grain production divided by state population
  - unit: tonnes
  - total food grain production:
    - total food grain (including cereals and pulses) production by state
    - source: Bulletin on Food Statistics, Ministry of Food and Agriculture, Directorate of Economics and Statistics
  - population: as above
- Real Per Capita Value of Crop Affected
  - deflated per capita crop value affected by flood
  - unit: 10 Rs
  - crop value affected by flood
    - source: Central Water Commission, India
  - deflator:
    - an industrial-worker-agricultural-labourer population weighted consumer index
    - using Consumer Price Index For Agricultural Labourers (State Rural Prices, Base Year 1973-74) and Consumer Price Index For Industrial Workers (State Urban Prices, Base Year 1973-74) with inter-state cost of living adjusted, from Ozler, Datt and Ravallion (1996). Primary source of the price indices is a number of government publications including Indian Labour Handbook.
    - the indices are weighted by rural and urban populations (as a share of total population) respectively. Rural and urban populations are from Ozler, Datt and Ravallion (1996) as well.

9.4 Media Penetration Variables

- Source: Press in India, Annual Report of the Registrar of Newspapers for India, Ministry of Information and Broadcasting, Government of India
- Newspaper/ Periodical Circulation Per Capita
  - average number of copies of newspaper/ periodicals sold or distributed free per publishing day divided by population
  - unit: thousands per person
- Other Newspapers Circulation Per Capita
  - defined as circulation of newspaper/ periodicals other than those in English or Hindi
- Newsprint Allocation Per Capita
  - Metric tonnes of newsprint allocation entitlement of publications within the state divided by population

9.5 Control Variables

- Proportion Of Scheduled Caste/ Tribe In Population
  - share of scheduled caste/ tribe population in total population
  - unit: proportion
  - source: censuses 1951, 61, 71, 81 and 91, Census of India, Registrar General and Census Commissioner, Government of India
  - all populations assumed to grow at a constant (compound) rate derived from the respective population totals for interpolation
- Population-Weighted Gini Coefficient
  - rural and urban Gini-coefficients weighted by respective populations
  - source (both Gini-coefficients & population figures): Ozler, Datt and Ravallion (1996)
- Literacy Rate
  - source: censuses 1951, 61, 71, 81 and 91, Census of India, Registrar General and Census Commissioner, Government of India
  - assumed to grow at a constant (compound) rate derived from the respective population totals for interpolation
  - unit: percentage points

TABLE 1
OWNERSHIP OF NEWSPAPERS IN INDIA 1958 - 1992

Ownership Type	No of Newspapers	Percentage of Total
Central Government	6.503 (8.70)	0.688
State Government	11.69 (8.15)	1.237
Individual	654.3 (759.23)	69.25
Joint Stock Company (Public Ltd.)	12.68 (19.10)	1.342
Joint Stock Company (Private Ltd.)	29.75 (49.80)	3.148
Firm or Partnership	47.35 (51.97)	5.012
Trust	20.11 (27.23)	2.129
Society or Association Including Religious Society	141.1 (142.99)	14.93
Educational Institution	15.34 (19.18)	1.623
International Organisation	0.050 (0.41)	0.005
Organ of Political Party	4.181 (4.12)	0.442
Foreign Mission	1.654 (5.05)	0.175
Total	944.8	100

Standard deviations in parenthesis.

TABLE 2
SUMMARY OF MAIN VARIABLES

State	Public Food Distribution Per Capita	Calamity Relief Expenditure Share In Net State Domestic Income	Total Food Grain Production Per Capita	Real Per Capita Value of Crop Affected	Newspaper/ Periodical Circulation Per Capita	Other Newspapers Circulation Per Capita	English Newspapers Circulation Per Capita	Hindi Newspapers Circulation Per Capita	Proportion Of Scheduled Caste/ Tribe In Population	Population-Weighted Gini Coefficient	Literacy Rate
Andhra Pradesh	11.61 (9.01)	0.414 (0.35)	185.8 (18.44)	8.252 (14.93)	0.029 (0.01)	0.029 (0.01)	0.003 (0.001)	0.001 (0.001)	0.191 (0.02)	30.39 (1.24)	30.69 (4.34)
Assam	24.68 (7.63)	0.395 (0.29)	150.4 (12.97)	10.80 (11.72)	0.018 (0.01)	0.013 (0.007)	0.003 (0.002)	0.001 (0.001)	0.209 (0.02)	21.95 (2.52)	42.00 (5.84)
Bihar	11.11 (6.00)	0.249 (0.24)	141.0 (19.69)	6.724 (9.17)	0.020 (0.01)	0.003 (0.002)	0.002 (0.001)	0.014 (0.011)	0.222 (0.012)	28.06 (2.87)	26.97 (4.62)
Gujarat	18.57 (10.51)	0.485 (0.46)	118.3 (30.59)	3.599 (6.28)	0.054 (0.008)	0.053 (0.009)	0.002 (0.001)	0.0005 (0.0004)	0.212 (0.008)	28.61 (2.10)	45.34 (6.17)
Haryana	9.813 (4.08)	0.190 (0.12)	467.6 (99.33)	8.799 (15.28)	0.020 (0.005)	0.004 (0.002)	0.004 (0.004)	0.013 (0.005)	0.193 (0.003)	28.96 (2.47)	39.39 (5.95)
Jammu & Kashmir	42.69 (11.21)	0.313 (0.44)	191.5 (30.50)	3.871 (12.67)	0.026 (0.01)	0.022 (0.006)	0.004 (0.003)	0.001 (0.001)	0.081 (0.004)	24.69 (2.02)	21.37 (5.33)
Karnataka	15.36 (7.77)	0.175 (0.25)	180.0 (24.58)	0.485 (1.84)	0.047 (0.01)	0.045 (0.01)	0.008 (0.002)	0.001 (0.001)	0.167 (0.03)	31.19 (2.00)	39.75 (6.59)
Kerala	45.97 (19.33)	0.178 (0.34)	54.88 (10.32)	3.607 (7.71)	0.151 (0.06)	0.162 (0.06)	0.004 (0.003)	0.001 (0.001)	0.103 (0.007)	34.10 (2.18)	73.54 (9.25)
Madhya Pradesh	7.564 (5.33)	0.198 (0.33)	255.7 (31.73)	0.552 (2.30)	0.022 (0.01)	0.0004 (0.002)	0.001 (0.002)	0.020 (0.017)	0.354 (0.02)	32.22 (2.32)	29.67 (5.99)
Maharashtra	28.27 (8.61)	0.253 (0.56)	147.7 (29.26)	0.339 (0.69)	0.117 (0.01)	0.055 (0.007)	0.0480 (0.01)	0.016 (0.008)	0.147 (0.03)	32.33 (2.82)	48.13 (7.58)
Orissa	10.94 (5.08)	0.580 (0.72)	222.0 (31.24)	5.604 (8.09)	0.016 (0.01)	0.018 (0.01)	0.001 (0.0005)	0.0004 (0.0005)	0.385 (0.008)	28.80 (1.72)	35.14 (6.57)
Punjab	15.95 (12.32)	0.253 (0.41)	668.5 (206.5)	9.946 (19.04)	0.058 (0.01)	0.045 (0.01)	0.004 (0.003)	0.012 (0.007)	0.290 (0.03)	30.95 (2.22)	39.39 (7.63)
Rajasthan	10.20 (8.76)	0.711 (1.01)	229.4 (45.25)	2.188 (4.64)	0.032 (0.01)	0.003 (0.001)	0.001 (0.003)	0.027 (0.018)	0.287 (0.008)	34.07 (3.51)	25.58 (5.62)
Tamil Nadu	21.24 (11.34)	0.157 (0.16)	150.9 (17.88)	1.007 (2.40)	0.116 (0.01)	0.095 (0.01)	0.018 (0.005)	0.004 (0.004)	0.192 (0.006)	31.58 (1.70)	46.45 (6.78)
Uttar Pradesh	8.106 (3.36)	0.168 (0.13)	213.0 (33.44)	9.727 (10.25)	0.035 (0.01)	0.005 (0.001)	0.003 (0.001)	0.028 (0.012)	0.218 (0.008)	29.73 (1.68)	28.27 (5.54)
West Bengal	34.50 (10.71)	0.291 (0.16)	159.9 (18.85)	7.972 (11.16)	0.070 (0.01)	0.042 (0.01)	0.019 (0.004)	0.008 (0.003)	0.253 (0.03)	28.68 (1.65)	45.15 (6.16)
TOTAL	19.77 (15.19)	0.3150 (0.46)	218.1 (154.98)	5.245 (10.52)	0.053 (0.04)	0.034 (0.04)	0.008 (0.01)	0.011 (0.013)	0.221 (0.08)	29.81 (3.79)	38.77 (13.84)

Standard deviations in parenthesis. See the Data Appendix for detail on construction and sources of variables.

TABLE 3
MEDIA DEVELOPMENT AND GOVERNMENT RESPONSIVENESS

	public food distribution per capita			calamity relief expenditure share in net state domestic income		
Model	(1)	(2)	(3)	(1)	(2)	(3)
total food grain production per capita	-0.024 (-2.96)	0.005 (0.39)	0.018 (0.94)	0.0003 (0.75)		
real per capita value of crop affected	0.032 (0.85)			0.013 (6.93)	0.007 (2.39)	0.006 (2.48)
(newspaper/ periodical circulation per capita)* (total food grain production per capita)		-0.390 (-3.26)	-0.380 (-2.55)			
(newspaper/ periodical circulation per capita)* (real per capita value of crop affected)					0.116 (2.26)	0.124 (2.77)
Newspaper/ periodical circulation per capita		146.2 (4.09)	183.1 (4.77)		1.945 (1.69)	2.841 (2.20)
log net state domestic income			1.299 (0.20)			-0.522 (-1.27)
ratio of urban to total population			68.28 (1.14)			-3.383 (-1.52)
population density			-40.93 (-2.23)			-1.377 (-1.97)
state effects	YES	YES	YES	YES	YES	YES
year effects	YES	YES	YES	YES	YES	YES
number of observations	493	496	439	455	485	455

t statistics in parentheses.

TABLE 4
POLARISATION AND GOVERNMENT RESPONSIVENESS

Model	public food distribution per capita			calamity relief expenditure share in net state domestic income		
	(1)	(2)	(3)	(4)	(5)	(6)
total food grain production per capita [FOOD]		-0.125 (-3.74)	-0.093 (-1.76)			
real per capita value of crop affected [CROP]					0.002 (0.11)	-0.002 (-0.08)
(newspaper/ periodical circulation per capita)* FOOD		-0.462 (-4.06)	-0.393 (-2.53)			
(newspaper/ periodical circulation per capita)* CROP					0.096 (1.64)	0.101 (1.90)
Proportion of scheduled caste/ tribe in population	-19.17 (-0.85)	-94.91 (-3.30)	-65.14 (-1.68)	-3.776 (-3.16)	-3.079 (-2.66)	-2.713 (-2.09)
(proportion of scheduled caste/ tribe in population)* FOOD		0.246 (3.14)	0.093 (0.75)			
(proportion of scheduled caste/ tribe in population)* CROP					-0.061 (-2.26)	-0.055 (-2.28)
population-weighted gini coefficient	0.551 (2.85)	-0.042 (-0.11)	-0.234 (-0.59)	0.022 (1.57)	0.013 (0.88)	0.013 (0.85)
(population-weighted gini coefficient)* FOOD		0.002 (1.95)	0.003 (1.99)			
(population-weighted gini coefficient)* CROP					0.0006 (0.69)	0.0007 (0.82)
Newspaper/ periodical circulation per capita		141.6 (4.15)	173.6 (4.58)		1.338 (1.11)	1.838 (1.22)
log net state domestic income			1.761 (0.26)			-0.500 (-1.22)
ratio of urban to total population			92.71 (1.60)			-2.091 (-0.83)
population density			-34.10 (-1.79)			-0.893 (-1.32)
state effects	YES	YES	YES	YES	YES	YES
year effects	YES	YES	YES	YES	YES	YES
number of observations	545	496	439	502	485	455

t statistics in parentheses.

TABLE 5
LANGUAGE AND GOVERNMENT RESPONSIVENESS

Model	public food distribution per capita			calamity relief expenditure share in net state domestic income		
	(1)	(2)	(3)	(4)	(5)	(6)
total food grain production per capita [FOOD]		0.014 (0.76)	0.042 (1.73)			
real per capita value of crop affected [CROP]					0.009 (2.47)	0.009 (2.63)
(English newspapers circulation per capita)* FOOD		-0.462 (-0.77)	-0.743 (-1.18)			
(Hindi newspapers circulation per capita)* FOOD		0.695 (1.31)	0.132 (0.23)			
(Other newspapers circulation per capita)* FOOD		-0.828 (-3.96)	-0.841 (-2.87)			
(English newspapers circulation per capita)* CROP					-0.262 (-0.72)	-0.406 (-1.11)
(Hindi newspapers circulation per capita)* CROP					0.029 (0.19)	0.104 (0.67)
(Other newspapers circulation per capita)* CROP					0.137 (2.31)	0.131 (2.11)
English newspapers circulation per capita	26.69 (0.30)	106.6 (0.76)	99.99 (0.78)	5.827 (0.99)	5.364 (0.88)	4.777 (0.77)
Hindi newspapers circulation per capita	-71.94 (-1.16)	-223.3 (-1.51)	-24.96 (-0.16)	0.209 (0.07)	-0.583 (0.18)	-1.649 (-0.44)
Other newspapers circulation per capita	182.0 (4.66)	284.9 (10.20)	404.4 (8.77)	1.487 (1.26)	0.810 (0.64)	2.634 (1.85)
log net state domestic income			0.517 (0.06)			-0.433 (-0.77)
ratio of urban to total population			-71.58 (-0.73)			-5.830 (-2.49)
population density			-75.96 (-3.15)			-1.754 (-2.10)
state effects	YES	YES	YES	YES	YES	YES
year effects	YES	YES	YES	YES	YES	YES
Number of observations	373	344	295	348	337	312

t statistics in parentheses.

TABLE 6
CONTROLLING FOR OMITTED VARIABLE CONCERNS

	public food distribution per capita			
	(1)	(2)	(3)	(4)
Model				
total food grain production per capita [FOOD]	0.0902 (2.056)	0.037 (0.927)	-0.007 (-0.261)	0.008 (0.486)
(English newspapers circulation per capita)* FOOD	-1.155 (-1.498)	-1.595 (-1.842)	-1.421 (-1.718)	-0.293 (-0.502)
(Hindi newspapers circulation per capita)* FOOD	0.488 (0.875)	0.502 (0.930)	0.434 (0.616)	0.784 (1.456)
(Other newspapers circulation per capita)* FOOD	-0.434 (-1.572)	-0.647 (-2.698)	-0.829 (-3.093)	-0.796 (-3.509)
English newspapers circulation per capita	263.174 (1.610)	301.033 (1.660)	220.759 (1.498)	94.363 (0.689)
Hindi newspapers circulation per capita	-167.696 (-0.972)	-134.913 (-0.819)	-141.005 (-0.769)	-238.077 (-1.570)
Other newspapers circulation per capita	225.452 (4.382)	259.720 (8.099)	243.243 (6.950)	283.706 (10.246)
(literacy rate)* FOOD	-0.001 (-2.357)			
literacy rate	-0.058 (-0.174)			
(log net state domestic income)* FOOD		-0.00001 (-0.783)		
log net state domestic income		0.007 (0.990)		
(length of national highways per capita)* FOOD			0.713 (1.027)	
length of national highways per capita			-35.786 (-0.206)	
(electoral cycle dummy)* FOOD				0.007 (0.821)
Electoral cycle dummy (1 if an election year or the year after, 0 otherwise)				1.152 (0.556)
state effects	YES	YES	YES	YES
year effects	YES	YES	YES	YES
Number of observations	280	320	258	342

t statistics in parentheses.

TABLE 7
CONTROLLING FOR OMITTED VARIABLE CONCERNS

	calamity relief expenditure share in net state domestic income			
model	(1)	(2)	(3)	(4)
real per capita value of crop affected [CROP]	0.010 (0.906)	0.007 (1.253)	0.007 (1.764)	0.005 (1.278)
(English newspapers circulation per capita)* CROP	-0.510 (-1.443)	-0.174 (-0.459)	-0.413 (-1.459)	-0.385 (-0.999)
(Hindi newspapers circulation per capita)* CROP	0.263 (1.709)	0.015 (0.097)	0.064 (0.445)	0.075 (0.506)
(Other newspapers circulation per capita)* CROP	0.176 (2.678)	0.126 (1.874)	0.228 (3.933)	0.176 (2.607)
English newspapers circulation per capita	4.151 (0.590)	5.220 (0.894)	-3.310 (-0.555)	5.836 (0.972)
Hindi newspapers circulation per capita	-0.277 (-0.075)	1.054 (0.292)	-0.778 (-0.218)	0.635 (0.200)
Other newspapers circulation per capita	2.293 (1.483)	0.874 (0.687)	2.619 (1.286)	0.671 (0.536)
(literacy rate)* CROP	-0.0001 (-0.534)			
literacy rate	-0.007 (-0.744)			
(log net state domestic income)* CROP		0.000001 (0.298)		
log net state domestic income		0.0001 (0.330)		
(length of national highways per capita)* CROP			-0.000002 (-0.462)	
length of national highways per capita			-6.213 (-0.826)	
(electoral cycle dummy)* CROP				0.005 (1.329)
Electoral cycle dummy (1 if an election year or the year after, 0 otherwise)				-0.016 (-0.250)
state effects	YES	YES	YES	YES
year effects	YES	YES	YES	YES
Number of observations	294	336	244	335

t statistics in parentheses.

TABLE 8
INSTRUMENTATION USING NEWSPRINT ALLOCATION

Model	public food distribution per capita	calamity relief expenditure share in net state domestic income
	(1)	(2)
total food grain production per capita	0.020 (0.871)	
real per capita value of crop affected		0.008 (2.554)
(newspaper/ periodical circulation per capita)* (total food grain production per capita)	-0.468 (-2.231)	
(newspaper/ periodical circulation per capita)* (real per capita value of crop affected)		0.119 (1.940)
Newspaper/ periodical circulation per capita	118.713 (2.673)	-1.603 (-0.709)
population density		
state effects	YES	YES
year effects	YES	YES
number of observations	382	400

t statistics in parentheses.

Figure 1: TOTAL NEWSPAPER/ PERIODICAL CIRCULATION PER CAPITA 1958-1992

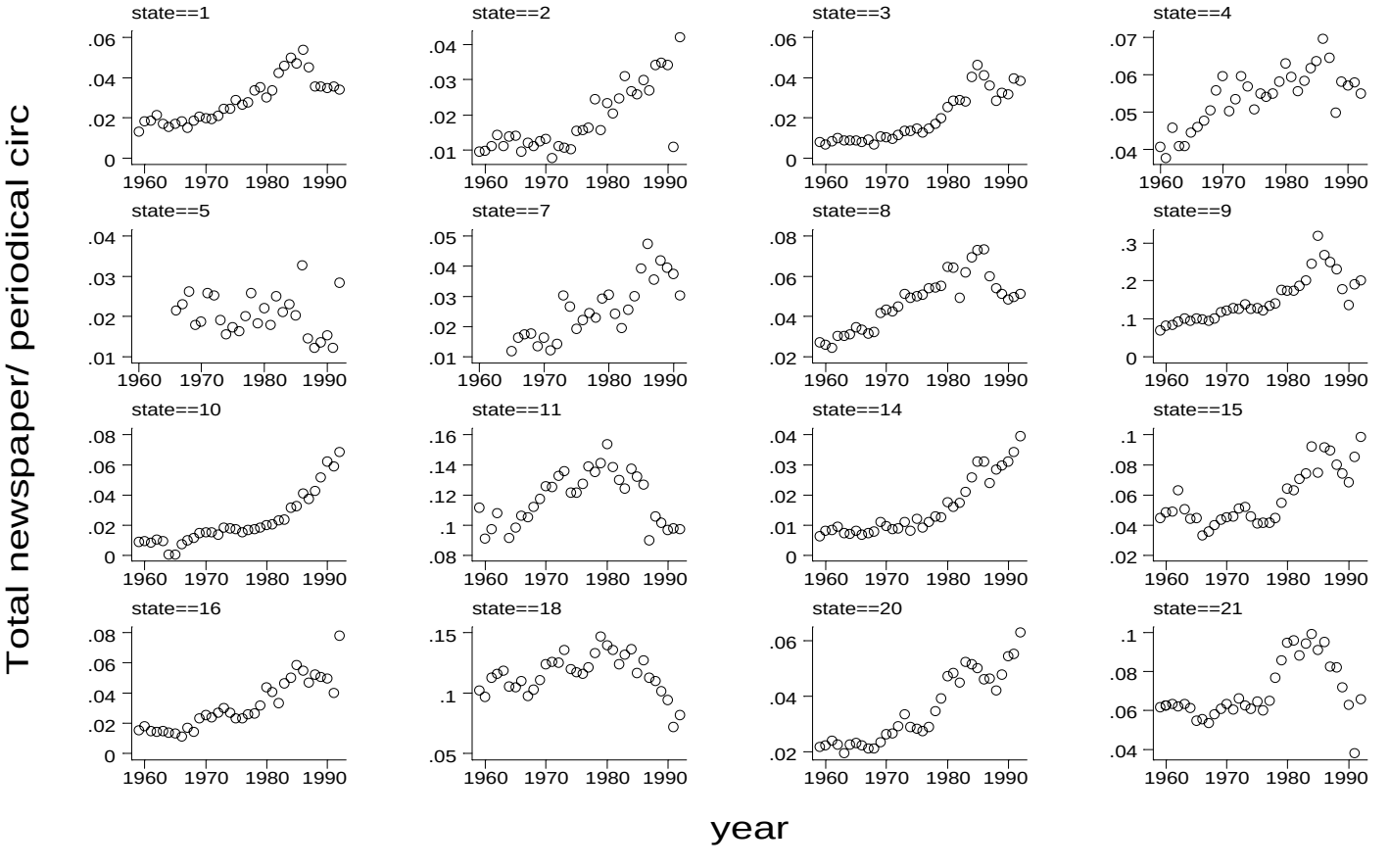

Figure 2: VARIATIONS IN FOOD GRAIN PRODUCTION 1958-1992

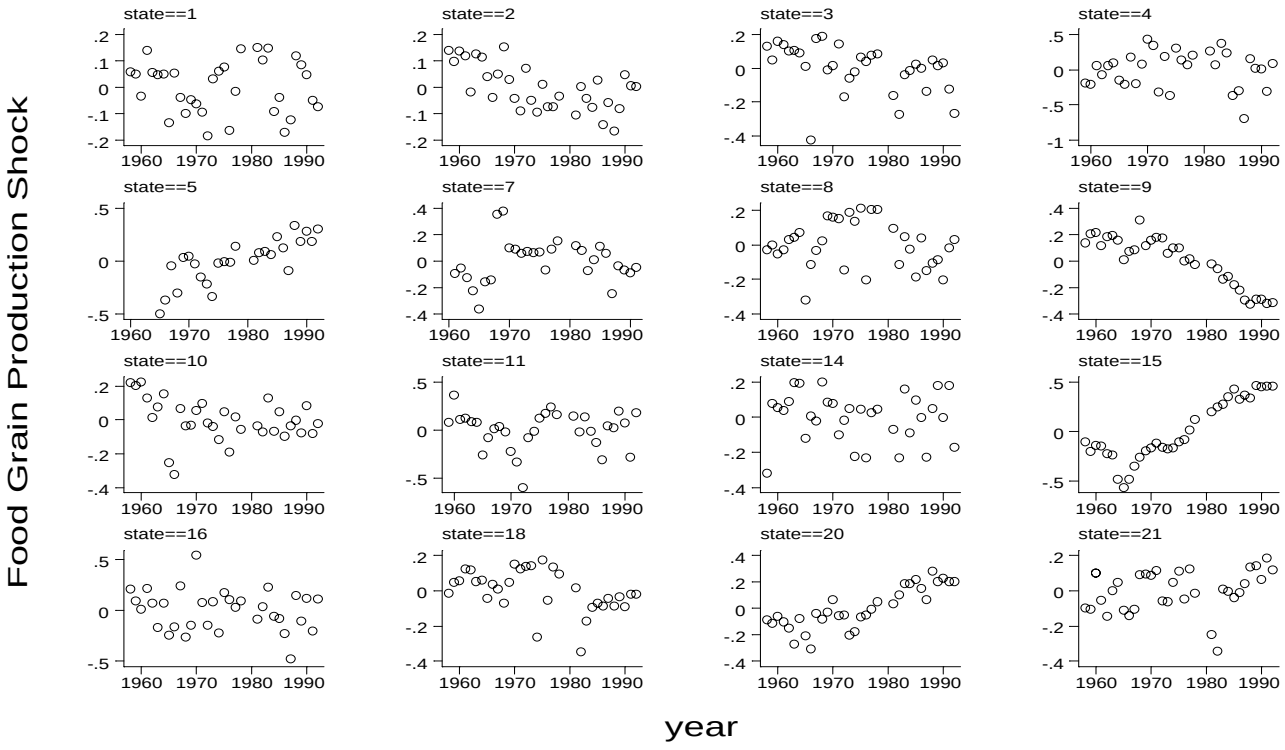

Figure 3: VARIATIONS IN VALUE OF CROP DAMAGED BY FLOODS 1958-92