Blame-Games, the Media and Discretionary Behaviour of Bureaucrats

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Abstract

Due to the public good character of protective measures against natural disasters events, their allocation is very often in the realm of bureaucratic and expert agencies. Based on the economic theory of bureaucracy the behavior of a bureau providing the good "protection against natural hazards" is analysed. The existing model is extended by further institutional constraints accounting for societal control via media. The main proposition is that negative media reports lead to a subsequent increase in the bureau’s formal output. The propositions of the model are tested using data of the U.S. Army Corps of Engineers’ spending on flood protection from 1968-2008.

Keywords: theory of bureaucracy, natural hazards, blame-shifting

JEL classification: D72, D73, D81, Q54

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1 Introduction

The recent earthquake/tsunami events in Japan, Hurricane "Katrina" in New Orleans or the Tsunami in South-East-Asia in 2004 are just a few examples that reveal our society’s vulnerability against natural disasters. Up to a certain degree, protection against natural hazards is possible. Structural measures such as dykes or avalanche barriers physically reduce the impact of natural hazards. Hazard-zone mapping identifies areas that are potentially affected by flooding or land-slides. Such maps can be used to prevent people from settling down in hazard-prone areas or induce them to build safer houses. Early warning systems in combination with proper information channels can identify upcoming hazards and organizational measures such as evacuations can at least reduce or prevent human losses (e.g. Tsunami warning system). Insurances provide a possibility to transfer the financial risks of extreme events and provide incentives for risk-adequate behaviour given that insurance premiums reflect the natural hazard risk. Under the consideration that a) according to research on the effects of climate change an increase in the frequency of extreme weather in the near future is likely (e.g. IPCC 2001) and b) public funds in general and for natural hazard management in particular are limited, society needs an institutional framework and decision processes that ensure the efficient allocation of these limited funds.

Although a certain demand for the good "protection against natural hazards" exists, it is very often under- or sometimes oversupplied. The public good characteristics of certain protective measures as well as imperfections on the market for disaster insurance (e.g. Jaffee & Russell 2003) can be seen as explanations for state intervention in this area. It can be observed that due to the complexity and the riskiness of the task, decision-making power over the allocation of these protective goods and services is very often delegated from politicians to bureaucrats or expert agencies. Such a delegation could provide the ground for inefficiencies due to principal-agent-problems and resulting organizational slack and over-supply of protection against natural hazards. In addition, this delegation creates uncertainty about who is responsible for the damages related to natural disasters. In addition, this delegation creates ambiguity about who is responsible for the damages related to natural disasters and who is to blame. After large-scale catastrophes we can witness a blame-game between different public entities in the media. In general media can have two effects on bureaucratic behaviour: First, it can reduce informal bureaucratic output. People learn via the media reports about the outcomes of public spending and organizational slack. Voters can put indirect pressure on bureaucrats to demand politicians to tighten public spending in certain areas. An overall loss of prestige of a bureaucratic agency also reduces the outside career opportunities of bureaucrats. Second, it can increase formal bureaucratic output. Media can
The economic theory of bureaucracy goes back to the work by Cyert & March (1963), who describes the phenomenon of organizational slack as rents that are generated through discretion by managers of a firm. Niskanen (1971), Migué & Bélanger (1974) and Breton & Wintrobe (1975) applied this idea to bureaus. Beside the task to provide the public good or service an agency was created for, bureaucrats have certain freedom to acquire rents in the form of discretionary profits. These undesired expenses could include additional equipment, employees or the discretion to award supplier contracts to companies with the best informal relations rather than the company with the most competitive offer. In particular, the propositions made by Niskanen’s modell have been applied empirically by various scholars (e.g. Grosskopf & Hayes 1993, Ott 1980). An econometric study by Kress (1989) with data on Colleges in California, confirmed Niskanen’s hypothesis that bureaucrats maximize both formal and informal output. However, the author did not find any evidence that the bureaus tend to oversupply their service.
According to Migué & Bélanger (1974) bureaucrats will choose that point on their budget line where the marginal rate of substitution between formal output and other expenses equals the slope of their budget line. In opposition to the conclusions by Niskanen (1971) the bureaucrat will produce a level of output somewhere between profit maximization and output maximization. This means that if the bureaucrats receive any utility from other expenses, they will not produce maximum output. The authors further conclude that the inefficiency of bureaus does not necessarily stem from oversupply, but from bureaucrats enjoying discretionary power. Duizendstraal & Nentjes (1994a) add two points of critique to Migué & Bélanger (1974)’s model. Firstly, the conclusion that an increase in demand for the public service will increase the relative expenses does not hold under the assumption made in the model. Secondly, Migué & Bélanger (1974) did not make assumptions concerning the institutional framework the bureau is embedded in. In a further paper Duizendstraal & Nentjes (1994b) incorporated this second point of critique in their model of non-profit organisations by analysing the manager’s behavior under four different subsidy regimes. In the following section the focus shifts from the general model of bureaus and non-profit-organizations on the the particular case of NHM-agencies.

3 Natural Hazard Management Agencies

Agencies or bureaus responsible for the provision of the good and service protection against natural-hazards (e.g. the US Army Corps of Engineers, the BUWAL in Switzerland or the WLV in Austria) feature similar characteristics as the standard model bureau. The notation "formal output” and "informal output” by Duizendstraal & Nentjes (1994b) also apply to NHM-agencies. The formal output is basically the good or service “protection against natural hazards” e.g. dykes, hazard zone maps or the distribution of information, where informal output includes additional staff or equipment. Certain NHM-tasks clearly demand experts and their knowledge e.g. identification of hazardous areas, estimates on the occurrence probability, as such tasks that can hardly be accomplished by politicians or citizens. However, this paper is concerned with allocation of goods and services through an agency (instead of politicians or directly by citizens) that goes beyond the sole provision of this information. The goods and services of interest are constrained to protective measures with a medium to long run perspective such as structural measures (e.g. constructions or protective forests), organizational measures (e.g. zoning and building codes) and adaptive strategies. Short term adaption instruments (e.g. road blocks, temporary evacuation) or risk transfer mechanism (e.g. ad-hoc financial relief, catastrophe funds) are cancelled out in this analysis.
Numerous scholars have already applied public-choice theory of bureaus on NHM-agencies. For example Shughart II (2006) points out that the US Army Corps of Engineers, responsible for the construction and maintenance of protective measures of various kinds, "[...] is famous for pork barrel and cost overruns (p. 40)". Beside discretionary behaviour bureaus dealing with low-probability-high-loss-events in general and NHM-agencies in particular show very distinct features from a public-choice perspective. Sobel & Leeson (2006) define two types of errors of public bureaus responsible for risky tasks that can lead to an inefficient provision of public goods and services: Type-one-errors occur if agencies are too under-cautious. For example a NHM-agency fails to build a protective barrier or maintain an existing one that might have saved a village from an avalanche. If a type-one error occurs and becomes visible to the media and the public the consequences for the responsible agency can be severe. In connection with the flood disaster following hurricane "Katrina" Shughart II (2006) points out that bureaucrats seemed to have neglected less visible infrastructure projects and maintenance work on existing infrastructure. The public outrage about sluggish maintenance of existing levees was immense.

Type-two-errors result from an agency's over-cautiousness. For example Peltzman (1973) estimates that the negative effects of not approved drugs by the U.S. Food and Drug Association (FDA) (trying to avoid the risk deaths by an approved but unsafe drug) outweigh the potential costs of ineffective or risky drugs permitted. The problem is that inefficiencies from type-two errors are less identifiable and visible. The installation of one additional avalanche barriers on an already secured hazard prone slope will possibly not be regarded as a waste of tax-money as "... you can never know what happens!". The reason why agencies might commit type-two-errors is basically that they do not want to be considered to commit a type-one-error. In other words, bureaucratic agencies have an incentive to be over-cautious and provide too much of their service because they do not want to be made responsible for disastrous events and the consequences for society.

In general, politicians tend to delegate the more unattractive but necessary tasks to other institutions or bureaus and keep "safer" tasks. For example Vaubel (1986) used this "dirty-work hypothesis" to explain international relations. He argues that national politicians try to transfer these tasks to international organisations (e.g. IMF) or supra-national political entities (e.g. EU). This might also apply to policies involving low-probability-high-loss events in general. Politicians shift the tasks related to natural hazard management - which is necessary however unattractive regarding the possiblility of catastrophes - and leave the risk of being punished by the public (and the voters) for "bad luck" to the bureaucrat. Through

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1 (Mueller 2003) gives a comprehensive overview of empirical studies on risk-avoiding bureaucrats.
2 Depending on the institutional design of the subsidy regime
this process of blame shifting the bureaucrat ends up as the scapegoat. The issue of shifting blame for threatening events has so far only been rarely addressed in political sciences and political economy. Stiglitz (1999) describe the blame-game situation related to the East Asian financial crisis in the late 1990s. Boin, Hart, McConnell & Preston (2010) illustrate the blame game dynamics in the aftermath of hurricane Katrina.

Basically there are two opposite considerations to blame-shifting: First, more risky tasks are also linked to greater rents. Second, shifting blame of unpopular but more efficient (but hard to communicate within day-to-day-politics or influenced by well-organized interest groups) tasks could also be welfare improving. Regarding the issue of natural hazard events politicians very often keep the post-event part of risk-management (e.g. federal compensation of losses) under their control. An empirical analysis by Garrett & Sobel (2003) on governmental assistance after natural catastrophes in the USA shows that FEMA’s disaster expenditure is significantly higher in election years (around $140 million as compared to non-election years). They conclude that almost half of FEMA disaster payments are politically motivated. Discretionary rubber boots politics are highly visible and accountable and therefore a preferable mean for politicians to gain votes. Schwarze & Wagner (2004) analyse the effects of the governmental ad-hoc assistance (“Schroeder-rule”) after the flooding in Germany 2002 and its effect on federal election results. On the opposite, unpopular preventive measures (e.g. structural measures at rivers that have negative impacts on the river’s eco-system, the extension of hazard zones) are very often transferred to bureaucrats. Stricter building codes or road blocks are rather accounted to the agency responsible for checking the compliance than to politicians who actually issued the law. The possibility of becoming the scapegoat of last resort creates incentives for the NHM-agencies to undertake actions that minimize this risk. The potential risk of being subject to a public backlash accompanied by a loss in prestige, funds or even the position can be seen as an institutional constraint a NHM-agency faces. The work by Duizendstraal & Nentjes (1994a) already pointed out the importance of this institutional constraints in the analysis of bureaucratic behaviour. Hence, this paper now tries to extend the model of Duizendstraal & Nentjes (1994b) by control mechanisms an agency faces.

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3It has received some attention within psychology

4After natural catastrophes, politicians very often enter the disaster areas, wearing rubber boots, and promising immediate and unbureaucratic financial assistance to the victims.
4 The model

The purpose of this model is twofold: In the first step the model by Duizendstraal & Nentjes (1994b) will be extended by an institutional variable accounting for a probable control through an auditing board, that might reveal organizational slack. This analyses the behavior of an ”ordinary” agency or non-profit organization, for example an infrastructure agency that provides street lighting.

In a second step, the model will be extended to analyse the behavior of a NHM-agency. Here we can assume an agency responsible for natural hazard management including hazard zone mapping and the installation of avalanche and torrent barriers. Regarding the subsidy framework, the model assumes a lump-sum regime. Infrastructure agencies in general, and NHM-agencies in particular mainly act under a lump-sum subsidy regime.

4.1 The behavior of an ordinary agency

The agency’s utility function is given by:

\[ u = u (x_1, x_2) \]  

where \( x_1 \) accounts for the amount of formal infrastructure output, in our case street lighting and \( x_2 \) describes the amount of fringe benefits, such as expensive office equipment or the placing of the contract to ”related” companies that deliver input factors at higher prices.

The agency’s cost function is

\[ c = c_1 (x_1) + c_2 (x_2) + \theta (z (x_2)) \]  

The term \( \theta (z (x_2)) \) reflects the institutional constraint of an auditing processes that the agency might be subject to, with \( z''_{x_2} < 0, z''_{x_2} = 0 \) and \( 0 < \theta < 1 \). Depending on the general institutional design, such an audit takes place in a constant manner e.g. yearly or by random testing. Depending on the design, the \( \theta \) can be considered as the probability that the auditing court reveals the extend of the organizational slack within the agency or the probability that a random auditing, with the certain outcome that slack is revealed, takes place. In comparison to the work by Banks (1989) and Banks & Weingast (1992) the control technology and thus the auditing costs are assumed to be fixed. \( z (x_2) \) describes the extent of disciplinary measures depending on the amount of organizational slack. This could be for example the introduction of more formalized control measures resulting in a loss of discretionary freedom and additional work or even the lay-off of employees or the management.
The total revenue \( r \) from charges for \( x_1 \) is

\[
r = p(x_1) \times x_1,
\]

where \( p' < 0 \) and \( r' < 0 \).

The agency maximizes its utility (1) under the constraint

\[
s + r = c_1 + c_2 + \theta(z_2),
\]

and under the constraints (2), (3). \( s \) accounts for the lump sum subsidy from the government. Under these constraints the agency’s budget constraint is

\[
x_2 = \frac{s + r - c_1}{c_2 + \theta(z_2)},
\]

where \( c_2 \) and \( \theta(z_2) \) account for the average costs of informal expenses described by the average cost of \( x_2 \) and the average expected costs of a potential audit \( z_2 \). The agency’s budget constraint is represented by function \( E \) in figure 1. The infrastructure agency’s budget constraint is set in comparison to the budget constraint derived by Duizendstraal & Nentjes (1994b), \( E \). In their model the agency’s indifference curve touches the budget constraint at point \( A \) and an amount \( x_1 \) of the formal output and an amount \( x_2 \) of other discretionary output are made. The obvious effect of the introduction of the term \( \theta(z_2) \) is an increase in the costs for other discretionary output relatively to formal output and a substitution effect towards more formal output. The infrastructure agency in this model, thus produces at point \( B \) an amount \( x_1^l \) of street lighting and \( x_2^l \) of other discretionary output.

The Lagrangian function for the normal agency’s problem is:

\[
\ell(x_1, x_2) = u(x_1, x_2) + \lambda \left[ s + r(x_1) - (c_1(x_1) + c_2(x_2) + \theta(z(x_2))) \right]
\]

The first order conditions are:

\[
u_{x_1} + \lambda [r_{x_1} - c_1'] = 0 \tag{7}
\]

\[
u_{x_2} + \lambda [-c_2' + \theta(z_{x_2})] = 0 \tag{8}
\]

Combining (7) and (8) results in the marginal rate of substitution between formal output
The NHM-agency faces the same utility function (1) as the normal agency. However, here $x_1$ describes the amount of protective measures e.g. hazard zone maps in municipalities, avalanche barriers or surveillance activities. The NHM-agency faces the following revenue function:

$$r_n = p_n(x_1) \times x_1 - \pi(x_1) \times m.$$  

(10)

The agency again receives a revenue $p(x_1) \times x_1$ from selling protective measures. In contrast to a normal infrastructure agency, its revenue also depends on the occurrence of an LPHL event. After e.g. a natural disaster took place the affected citizens and, depending on the media coverage, the public as a whole make politicians at least partially responsible for this event. Due to the delegation of the task, the politicians have now the option to shift a certain amount or all of the blame to the agency. The likelihood that negative media reports occur and an amount of blame and related negative consequences, $m$, are shifted to the agency is $\pi$, where $0 < \pi < 1$. At this stage we assume that $x_1$ accounts for protective measures that influence the occurrence probability of a LPHL-event, e.g. certain structural measures (avalanche barriers located at the potential incipient crack of an avalanche or surveillance activities). The agency can thus influence the expected amount of blame-shifting through the provision of formal output $x_1$. Therefore, the bureaucrats incorporate this blame-game-premium in their revenue function in order to insure themselves against negative consequences.

In addition we assume that $m$ is a constant reflecting e.g. a liability process. Looking at flood hazards as an example: Given limited public finances and thus a limited budget for the NHM agency, the bureaucrats can only install dykes and other protective measures in some areas (and thereby reducing $\pi$), while other places are put on hold. If a flood hits an unprotected area the number of protected places does not really matter, citizens and politicians will make the agency liable. This assumption further accounts for the observation that, at least in the area of natural hazard management, agencies very often prefer visible (and budget-intensive) structural measures, that reduce the occurrence probability rather than less visible (and very often less budget-intensive) measures (e.g. zoning, temporal evacuation or road blocks or the advice the purchase of an insurance).
For equation \(10\) we assume that \(r_n = r\), showing that an LPHL-agency faces the same total amount of revenue. However, as \(\pi' < 0\) the marginal revenue between a normal agency and an LPHL-agency differs, \(r' < r'_n\). This revenue function flattens the NHM-agency’s budget constraint and, after repeating the maximization steps, also changes the marginal rate of substitution. The graphical interpretation of the model again is represented in figure 1. \(E^n\) is the LPHL-agency’s budget constraint. Due to the assumption of potential blame shifting, a further substitution effect towards formal output, protection against natural-hazards, takes place. The NHM-agency produces at point \(C\) an amount \(x^n_1\) of formal output and an amount of \(x^n_2\) of informal output.

**Proposition 1** An agency or bureau that faces higher attention from the media produces relatively more formal output \((x_1)\), but relatively lower cost inefficiencies \((x_2)\) as a normal bureau.
4.3 Changes in demand, budget and responsibility

After natural disasters occurred individuals are more sensibilised politicians tend to provide bureaucrats with additional funds and responsibilities. Kahneman, Slovic & Tversky (1982) described this phenomenon as "availability bias". Individuals tend to put relative greater attention to certain risks that actually feature a rather low probability of occurrence, but have a bigger psychological (e.g. higher media-attention) and/or physical (e.g. a disaster happened within the region the individual lives in) presence. First, it is assumed that citizens’ demand for protective measures increases, \( p^* < 0 \) and \( p^* < p' \) and second, that the government is increasing the lump-sum subsidy for the agency, \( S^* > S \). The increase in demand has effects on the \( p(x_1) \times x_1 \) part of the agency’s revenue function, but no effects on the \( \pi(m(x_1)) \) part, the expected penalty from blame shifting. This leads to an increase in both cost and allocative inefficiencies. Depending on the relative increase of lump-sum subsidy, the allocative and the cost efficiencies might increase at the same level. An overreaction by the government and a relatively high increase of subsidies, could also result in a relatively higher increase of the cost-inefficiencies.

However, the shift of additional funds is very often related to the delegation of additional responsibilities and thus, a higher load of blame to be loaded on the agency if something bad happens. This would mean that the agency’s blame-game premium would not only depend on the amount of protective measures installed, but also on the amount of subsidies received, \( \pi(m(x_1), S) \). The agency’s budget constraint is now flatter and the income effect would again increase both, cost and allocative inefficiencies, but the increase of allocative inefficiencies is relatively higher.

**Proposition 2** An increase in lump-sum subsidies by the government and increased demand for protective measures, combined with an additional shift of responsibilities leads to a relatively higher increase of formal output (ceteris paribus).

If the NHM-agency observes an increase in the frequency of natural disasters (e.g. a rise in extreme weather events through climate change) the probability \( \pi \) will also rise. Keeping the demand and lump-sum subsidy constant, allocative inefficiency will also increase.

**Proposition 3** An increase in the frequency of natural hazards results in additional provision of protective measures by NHM-agencies (ceteris paribus).

5 Empirical application

I test the above proposition with a sample on the USACE’s expenditure on flood control projects. Blame-shifting via the media and its negative impact on the public perception
of an agency’s output increases the output in preceding periods in order to prevent future blame-shifting. Expenditure on flood protection and media reports on flood disasters might move in tandem. However, it is not clear whether the latter drives the former or vice versa. To disentangle the relationship a Vector Autoregression model (VAR) in the following form is specified:

$$\Delta \text{FloodExp}_t = \alpha + \sum_{i=1}^{k} \beta_i \Delta \text{FloodExp}_{t-i} + \sum_{i=1}^{k} \Delta \text{Corps}_{t-i} + \sum_{i=1}^{k} \text{Media}_{t-i} + \sum_{i=1}^{k} \Delta \text{Flood Damage}_{t-i} + \epsilon_t$$

(11)

*FloodExp* is the fraction of the USACE’s total budget used for flood control measures in year $t$. We use this variable as an empirical proxy for the USACE’s effort. The explanatory variable of interest is *Media*, which is a dummy variable that switches to 1 if there has been at least one negative report on one of the major U.S. TV station in connection with flood control measures and the USACE in $x$ preceding years. We expect this variable to have a positive impact on the dependent variable. *Flood Damage* contains the total financial losses from flood and hurricane disasters in the U.S. in $x$ preceding years. The purpose of this variable is to control for potential short term shocks in the public demand for flood protection following a major disasters. Based on the propositions made in section 4, the coefficient of this variable should be positive. *Corps* denotes the total USACE’s budget in previous years and $\epsilon$ is the error term. The dataset is composed of yearly data from 1968 to 2008. A detailed description of the variables and datasources can be found in the appendix section of this paper. Table 1 reports the descriptive statistics.

A critical assumption of the VAR-model is that all variables are stationary. A battery of unit-root tests is applied to test for the presence of a time trend that drives the correlation between the variables. If the hypothesis of non-stationarity cannot be rejected, the relevant variables are considered in first differences. Taking the first difference removes a common time trend and the spurious correlation. The results of the unit-root tests are presented in table 2. All three unit-root tests, the DF-GLS, the augmented Dickey-Fuller as well as the Phillippe and Peron test cannot reject the null of non-stationarity for *FloodExp*, *Corps* and *Flood Damage* but is strongly rejected for *Media*. However, after taking the first differences ($\Delta$, all variables pass the test. Therefore, the first differences of *FloodExp*, *Corps* and *Flood Damage* while *Media* is included in levels. To select the suitable lag structure again a

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number of different tests are considered (see Table 3). The second length is selected by the Akaike Information Criterion (AIC).

Table 4 presents the main results. The second lag of Media depicts a positive coefficient that is significantly different from zero at the 5%-level. This result for the media variable are consistent with proposition 1 of the theoretical model that blame-shifting in the media can have a positive effect on a bureaucratic agency’s output. The coefficients are positive and significant. One explanation for this lagged reaction could be found in delays in the USACE’s internal budget allocation. It might take time until the information from the negative publicity is incorporated in budget planning and ultimately implemented in actual flood protection projects. The coefficient for lagged Flood Damage is also positive and significant at the 5%-level, which supports proposition 3 that an increase in the frequency of natural hazards results in additional provision of protective measures by NHM-agencies (ceteris paribus). Corps has a positive sign but is not statistically different from zero. The AIC indicates that overall our model fits the data well. The Jarque-Bera test statistics indicate that the disturbances are normally distributed. The Lagrange Multiplier (LM) test rejects the null of serial correlation. Additional tests show that all eigenvalues lie inside the unit circle and that the VAR model satisfies the stability condition. The Granger causality tests reveal that the variation in FloodExp is driven by second lags of the first difference of past flood damage, ΔFlood Damage, and the second lag of past media years, Media.

6 Conclusion & Suggestions

This paper analyses the behavior of natural-hazard-management agencies and the effect of negative media reports the provision of protective measures. Blame-games in the media and more frequent natural disasters can increase the provision of public goods by bureaucratic agencies. However, this paper makes no normative assumption about the efficiency of this increase in protective goods. An interesting question for future research is of normative nature: Which are the optimal societal decision mechanisms for the allocation of the good ”protection against natural hazards”\(^6\)? Further analysis needs to be done concerning the issue how members of society will decide upon decision mechanisms for protection against LPHL-events at the constitutional table (behind a veil of ignorance).

A normative analysis of societal decision mechanisms could be of particular interest regarding the aspect of blame-shifting. The transfer of decision power for the allocation of the good ”protection against LPHL-events” to a direct democratic process would also shift the responsibility to the voters. This would mean that if the peoples’ decision was ”wrong”\(^6\) Results available upon request
(e.g. a flood damaged an unprotected area) there is no political or bureaucratic identity that can be made responsible for. According to the propositions made in a recent paper by Buchanan (2005), "people are afraid to be free". He suggests, that individuals transfer tasks to others (or the state) in order to deny personal responsibilities. Taking this thought into account, a normative analysis of the optimal decision mechanism for the allocation of protection that would be chosen behind a veil of ignorance would be very fruitful.
References


A Datasources

http://www.gpoaccess.gov/usbudget

http://www.gpoaccess.gov/usbudget

Media: Data on news coverage is provided by the Vanderbilt Television News Archive which contains news broadcasts and stories from the major U.S. national broadcast networks (ABC, CBS, CNN and NBC) since 1968. A keyword search was performed and each article including ”Corps of engineers” and ”flood” was screened for negative comments. An appendix with a complete collection of reports is available upon request (accessed April 2009).

Table 1: Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FloodExp</td>
<td>46</td>
<td>4.059</td>
<td>1.665</td>
<td>0.888</td>
<td>6.515</td>
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<tr>
<td>Corps</td>
<td>46</td>
<td>2889.696</td>
<td>1311.027</td>
<td>944.000</td>
<td>6944</td>
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<tr>
<td>Media</td>
<td>46</td>
<td>0.174</td>
<td>0.383</td>
<td>0.000</td>
<td>1.000</td>
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<tr>
<td>Flood Damage (in mill. USD)</td>
<td>46</td>
<td>9.019</td>
<td>24.792</td>
<td>0.000</td>
<td>158.960</td>
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</table>
Table 2: Unit root test

<table>
<thead>
<tr>
<th></th>
<th>DF-GLS</th>
<th>ADF</th>
<th>PP</th>
<th>DF-GLS</th>
<th>ADF</th>
<th>PP</th>
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</thead>
<tbody>
<tr>
<td>FloodExp</td>
<td>−3.186</td>
<td>−2.327</td>
<td>−2.313</td>
<td>ΔFloodExp</td>
<td>−4.222***</td>
<td>−3.863***</td>
</tr>
<tr>
<td>Corps</td>
<td>−1.283</td>
<td>0.678</td>
<td>−1.562</td>
<td>ΔCorps</td>
<td>−0.836***</td>
<td>−4.129***</td>
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<tr>
<td>Media</td>
<td>−5.055***</td>
<td>−4.124***</td>
<td>−7.008***</td>
<td>ΔMedia</td>
<td>−7.710***</td>
<td>−7.013***</td>
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<tr>
<td>Flood Damage</td>
<td>−4.938***</td>
<td>−0.871</td>
<td>−4.796***</td>
<td>ΔFlood Damage</td>
<td>−7.117***</td>
<td>−5.125***</td>
</tr>
<tr>
<td>Critical Value 5%</td>
<td>−3.209</td>
<td>−2.950</td>
<td>−2.944</td>
<td></td>
<td>−3.216</td>
<td>−2.952</td>
</tr>
</tbody>
</table>

Notes: Unit roots are tested using DF-GLS, Augmented Dickey and Fuller (ADF) and Phillips and Peron (PP) tests.

Table 3: Lag selection-order criteria

<table>
<thead>
<tr>
<th>Lag</th>
<th>LL</th>
<th>LR</th>
<th>p-value</th>
<th>AIC</th>
<th>HQIC</th>
<th>SBIC</th>
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<tbody>
<tr>
<td>1</td>
<td>−560.337</td>
<td>92.891</td>
<td>0.000</td>
<td>27.6351</td>
<td>27.938</td>
<td>28.463</td>
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<tr>
<td>2</td>
<td>−547.114</td>
<td>26.446</td>
<td>0.048</td>
<td>27.7673</td>
<td>28.313</td>
<td>29.257</td>
</tr>
<tr>
<td>3</td>
<td>−537.267</td>
<td>19.695</td>
<td>0.234</td>
<td>28.0603</td>
<td>28.849</td>
<td>30.212</td>
</tr>
</tbody>
</table>

Table 4: Estimated effects of media reports on flood control expenditure

<table>
<thead>
<tr>
<th></th>
<th>ΔFloodExp</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔFloodExp_{−2}</td>
<td>−0.115</td>
</tr>
<tr>
<td></td>
<td>(0.147)</td>
</tr>
<tr>
<td>ΔCorps_{−2}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
<tr>
<td>Media_{−2}</td>
<td>0.827**</td>
</tr>
<tr>
<td></td>
<td>(0.408)</td>
</tr>
<tr>
<td>ΔFlood Damage_{−2}</td>
<td>0.023**</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
</tr>
<tr>
<td>AIC</td>
<td>27.650</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
</tr>
<tr>
<td>LM-Test chi^2</td>
<td>11.803</td>
</tr>
<tr>
<td></td>
<td>(0.757)</td>
</tr>
<tr>
<td>Prob&gt;chi^2</td>
<td>0.129</td>
</tr>
<tr>
<td></td>
<td>(0.937)</td>
</tr>
</tbody>
</table>

Notes: Dependent variable: FloodExp. Robust standard errors in parentheses. ***; **; * indicate significance at the 1, 5 and 10%-level, respectively.
Table 5: Granger Causality Test

<table>
<thead>
<tr>
<th>Equation</th>
<th>Excluded</th>
<th>$\chi^2$</th>
<th>Prob&gt;(\chi^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta$FloodExp</td>
<td>$\Delta$Corps</td>
<td>0.128</td>
<td>0.938</td>
</tr>
<tr>
<td>$\Delta$FloodExp</td>
<td>Media</td>
<td>6.752</td>
<td>0.034</td>
</tr>
<tr>
<td>$\Delta$FloodExp</td>
<td>$\Delta$Flood Damage</td>
<td>5.019</td>
<td>0.081</td>
</tr>
<tr>
<td>$\Delta$FloodExp</td>
<td>All</td>
<td>13.162</td>
<td>0.041</td>
</tr>
<tr>
<td>$\Delta$Corps</td>
<td>$\Delta$FloodExp</td>
<td>1.628</td>
<td>0.443</td>
</tr>
<tr>
<td>$\Delta$Corps</td>
<td>Media</td>
<td>9.281</td>
<td>0.010</td>
</tr>
<tr>
<td>$\Delta$Corps</td>
<td>$\Delta$Flood Damage</td>
<td>62.993</td>
<td>0.000</td>
</tr>
<tr>
<td>$\Delta$Corps</td>
<td>All</td>
<td>87.414</td>
<td>0.000</td>
</tr>
<tr>
<td>Media</td>
<td>$\Delta$FloodExp</td>
<td>0.547</td>
<td>0.761</td>
</tr>
<tr>
<td>Media</td>
<td>$\Delta$Corps</td>
<td>2.881</td>
<td>0.237</td>
</tr>
<tr>
<td>Media</td>
<td>$\Delta$Flood Damage</td>
<td>3.861</td>
<td>0.145</td>
</tr>
<tr>
<td>Media</td>
<td>All</td>
<td>5.347</td>
<td>0.500</td>
</tr>
<tr>
<td>$\Delta$Flood Damage</td>
<td>$\Delta$FloodExp</td>
<td>0.255</td>
<td>0.880</td>
</tr>
<tr>
<td>$\Delta$Flood Damage</td>
<td>$\Delta$Corps</td>
<td>1.015</td>
<td>0.602</td>
</tr>
<tr>
<td>$\Delta$Flood Damage</td>
<td>Media</td>
<td>3.309</td>
<td>0.191</td>
</tr>
<tr>
<td>$\Delta$Flood Damage</td>
<td>All</td>
<td>4.345</td>
<td>0.630</td>
</tr>
</tbody>
</table>

B Appendix
Media reports used to construct variable *Media*:

Source: Vanderbilt Television News Archive which contains news broadcasts and stories from the major U.S. national broadcast networks (ABC, CBS, CNN and NBC) since 1968. A keyword search was performed and each article including "Corps of engineers" and "flood" was screened for negative comments. The variable switches to 1 if there was at least one TV-report with critical comments on the USACE’s work in a given year and 0 otherwise. Dummy=1 in years 1972, 1977, 1979, 1983, 1993, 1994, 1997 and 2005.
Evening News states noted. President Carter’s declaration of Georgia as disaster area, in wake of collapse
of earthen dam at Toccoa, noted. REPORTER: Barbara Walters (Toccoa, Georgia) Report on aftermath of
flood at Toccoa, Georgia. 1st victims were students at Toccoa Falls Bible College, and nearly
all dead were associated with school. [Paul WILLIAMS - talks of parents’ deaths.] [Army Corps of
Engineers spokesperson Colonel Frank WALTER - has no information re: reason for collapse yet; cites
Corps report on dams made available to state and local govts.] (DC) Dam burst in Buffalo Creek,
West Virginia, similar to Georgia dam burst. noted. (Film shown.) Congress authorization of Corps
to investigate problem of nonfederal dams and results of inventory by Corps described. [Representative Leo RYAN
- cites danger of such dams, using Kelley Barnes Dam as example] Corps’ estimates of amount needed to fund
local dam inspections, Nixon administration’s policy of nonfederal government responsibility and Carter administration’s maintenance of this policy, so far, noted. Corps has received some funds for local dams, but administration policy not yet clear.

CBS Nov 07, 1977 Abstract: (Studio) President Carter’s declaration of Toccoa, Georgia, as disaster area in wake of dam burst
there noted. REPORTER: Walter Cronkite (Toccoa, Georgia) Report on aftermath of flood and cleanup efforts;
damage to area, include Toccoa Falls Bible College, noted. [Georgia governor’s office spokesperson Tom PERDUE -
does not find cause of dam burst, due to complete demolition of dam.] Army Corps of Engineers
spokesperson Colonel Frank Walter’s speculation with regard to dam burst cited. Other dams in Georgia designated
by Corps as hazardous and details with regard to designation and inspection stated. [Corps spokesperson General
Kenneth McIntyre notes need for inspection of small dams across US.] REPORTER: Bruce Hall (Studio) House
subcommittee’s hearings on dam safety earlier in year noted. REPORTER: Walter Cronkite (DC) [Subcommittee
chairperson Leo RYAN - cites belief that other dams have same potential as Toccoa dam did to burst; cites Kelley
Barnes Dam as example] Congress provision for Corps inspection of dams, but without funds to carry it out. noted.
[RYAN - cites money spent on airport safety and says dam safety ought to have same spent on it.] Ryan’s suggestion
of putting jobless to work repairing dams noted.

NBC Mar 27, 1979 (DC) Army Corps of Engineers project on Red River in Louisiana said typical Corps venture; details given.
Films shown. Incr. in estimated cost of project since congress authorization 10 years ago reported; graph shown.
Corps reassessment of benefits gained by project cited. Federal law with regard to economy benefits of Corps projects
in relationship to cost to taxpayers quoted. Allegations of cost underevaluations by Corps and Corps’ defense of
projects stated. Corps’ position with regard to Red River project detailed; uselessness of lake created by project
pointed out [Corps spokesperson Lieutenant General John MORRIS - comments.] Corps claim of flood prevention
and erosion control benefits from Red River project and ordinance of lying by Corps reported [Corps OFFICIAL -
talks about exaggeration by Corps with regard to project expenses; says was directed by superiors to lie.] [MORRIS -
denies orders re: falsification.] Fabrication of benefit analysis of Tennessee River-Tombigbee Canal project
detailed. Admin. abandonment of plan to strip Corps of authority to calculate costs and benefits said due to
congress opposition to plan; Congmen. reported to see Corps as source of money for home districts. REPORTER:
Robert Bazell

NBC Apr 19, 1979 (Jackson, Mississippi) Concern in Jackson over lack of warning cited [TIC. PEPPER - comments with regard to need
for warning system.] Jackson mayor’s response to complaints quoted. [Mayor Dale DANKS - comments with regard to
inaccuracy of Army Corps of Engineers info.] Corps response noted. REPORTER: George Lewis

CBS Apr 24, 1979 (Silver Spring, MD) Criticism of National Weather Service flood warnings outlined; Red. River situation cited.
Clark quoted with regard to overtaking of Army Corps of Engineers flood control projects. [CLARK - comments on
flood control projects.] Amt. of damage from past week’s floods stated. REPORTER: Barry Serafin (Studio)
Environment group spokesperson quoted with regard to poor government approach to flood control money in
Mississippi. REPORTER: Walter Cronkite

ABC Apr 11, 1983 (Studio) Amt. of damage in flood-ravaged South mentioned. REPORTER: Max Robinson (Sidell, LA) Efforts of
south Louisiana to recover from floods examined; films shown. Corps of Engineers role in region noted;
[Parish president Bruce YUNIGAS - thinks Corps has responsibility to reevaluate their projections and take quick
action.] Govt.’s assurances against flooding to Frank and Jan Hyde noted; state of their house at present
shown. [Jan HYDE - is tired of bureaucratic delays.] REPORTER: Bob Sirkin
Station | Date | Content
--- | --- | ---
ABC | Jul 19, 1993 | (Studio: Renee Poussaint) Levels of the Mississippi River in Prairie du Chien, WI, Davenport, Iowa, Quincy, Illinois, and Saint Louis noted. (Saint Louis: Tom Foreman) The flooding near Saint Louis and the criticism of the man-made levee system featured; scenes shown of water flowing over the levees. [Conservationist Dale PONTIUS, Army Corps of Engineers Gary DYHOUSE - offer differing opinions on the levee system of the Army Corps of Engineers.]

ABC | May 26, 1994 | (New York: Ned Potter) President Clinton's decision to reverse the flood policy of rebuilding levees to one of moving homes out of the flood plain featured; scenes shown from July 1993 where the levee broke in Quincy, Illinois, and from Valmeyer, Illinois, where the town voted to move to higher ground. [American Rivers Scott FABER - comments.] [Senator Max BAUCUS - calls for a new Army Corps of Engineers' strategy.]

CBS | Nov 07, 1997 | (Marysville, California: Sandra Hughes) The possible effects of El Nino on California agriculture and how flooding will cause shortages and higher prices outlined; scenes shown from along the levees. [Farmer Dale NIESHELTZ, Army Corps of Engineers Jason FANSELAU - talk about last year's flood and the failure of the system of levees to prevent flooding.]

FOX | Sep 15, 2005 | (Studio: Shepard Smith) Tonight's French Quarter address by President Bush, and New Orleans Mayor Ray Nagin's plans to reopen large sections of the city reported. [NAGIN- says the city will "breathe again."] [New Orleans: Phil Keating] Details given of plans to reopen parts of the city; progress reports from sewage and water department quoted; scenes shown of debris and cleanup. [NAGIN- hopes to keep the city safe.] Plans to use the infamous Convention Center to house retail outlets for returning residents to get supplies for rebuilding noted. (Studio: Shepard Smith) Red Cross statistics on damage in Mississippi quoted; scenes shown of flood waters, and the destruction in Port Sulphur, Louisiana. [Port Sulphur storm victim Nick GIBSON- plans to move back.] Details given of newly approved Senate housing vouchers for displaced Gulf Coast residents. (Traveling with the president in New Orleans: Carl Cameron) Details given of the speech Bush will give tonight from Jackson Square; excerpts from speech quoted on screen; scenes shown of Bush's tour through Pascagoula, Mississippi. (Studio: Shepard Smith) An admission by the head of the Army Corps of Engineers of mistakes made in handling the levee breaches in New Orleans reported. (Washington: Steve Centanni) "New York Times" interview with former FEMA director Michael Brown blaming the botched Katrina response on disorganization of Louisiana officials quoted on screen; Louisiana Governor Kathleen Blanco quoted as saying resources were available to Brown.
