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**Research Report**

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# Voters Response to Natural Disasters Aid: Quasi-Experimental Evidence from Drought Relief Payment in Mexico

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## Abstract

We estimate the effect of a government climatic contingency transfer allocated through the recently introduced rainfall indexed insurance on Presidential election returns in Mexico. Using the discontinuity in payment based on rainfall accumulation measured on local weather stations that slightly deviate from a pre-established threshold, we show that voters reward the incumbent presidential party for delivering drought relief compensation. We find that receiving indemnity payments leads to a significant average electoral support for the incumbent party of approximately 7.6 percentage points. Our analysis suggests that the incumbent party is rewarded by disaster aid recipients and punished by non-recipients. This paper provides evidence that voters evaluate government actions and respond to disaster spending contributing to the literature on retrospective voting.

**Keywords:** Disaster Spending, Voting, Regression Discontinuity, Political Accountability.  
JEL Codes: D72, H84, I38, O38



Are there electoral returns to government disaster aid? This is a central question in terms of political accountability in democratic societies and has recently attracted scholarly attention in political economy.

Identifying the effect of government transfer policies --such as disaster relief-- on individual political behavior is a challenging task. A set of growing literature provides empirical evidence of a positive electoral effect of government provision of economic benefits (Manacorda, Miguel and Vigorito 2010; Pop-Eleches and Pop-Eleches 2009; Litschig and Morrison 2009; Rodriguez-Chamussy 2009). However, assessing voter's response to compensation received after a natural contingency imposes additional difficulties. In effect, empirical studies trying to test voter responsiveness to disaster aid face at least three types of problems. First, the targeting of relief action and resources may not be exogenous as politicians might target public resources towards swing voters or channel resources to core supporters as a reward to their loyalty. Second, even when the natural shock producing adverse effects for the population may be exogenous, the extent of the damages and losses is potentially endogenous as vulnerability to natural catastrophes may differ among localities and populations. Finally, there are several confounding factors interacting with government disaster spending (media coverage, actions of NGOs and volunteer aid, etc.) and some of these may cancel out estimates of a potential effect of relief transfers.

In this paper we use a quasi-experimental approach to provide evidence on the electoral effect of government economic transfers as compensation for the damage caused by a natural shock: severe drought on rain-fed agricultural regions. Exploiting the discontinuity in payment of a government funded climatic contingency aid program in Mexico, we show that voters re-

ward the incumbent presidential party for delivering drought relief compensation. In 2005, after a severe drought the Mexican Federal Government delivered for the first time drought compensation payments under the Weather Index Insurance program. Provided that the Weather Index Insurance program was designed to allocate indemnity payments according to a strictly defined pre-established rainfall cutoff, we employ a regression discontinuity (RD) design to compare outcomes across electoral sections that were covered during 2005 by the insurance program and had similar levels of rainfall but differed in whether they experienced government aid in the form of a monetary transfer or not. This enables us to address the possibility of omitted variable bias between recipients of relief compensation and their counterparts who experienced a drought but did not qualify for compensation.

The basic regression model used through the analysis is given by equation (1):

$$Vote_i = \delta BelowCutoff_i + f(rainfall_i) + \beta X_i + \varepsilon_i$$

where  $Vote_i$  represents the electoral outcome of interest – the share of votes for the incumbent party – in the electoral unit  $i$ .

$BelowCutoff_i$  is an indicator variable equal to 1 if the accumulated rainfall during the sowing season is less than the minimum cutoff for the program, and 0 otherwise. The main coefficient of interest in the analysis is  $\delta$ , which indicates the effect of being in an area that corresponds to receiving government aid after a drought on the relevant outcome. The term  $f(rainfall_i)$  denotes a smooth function of rainfall, which is the forcing variable in the context of this regression discontinuity design.

Finally,  $X_i$  includes a set of control variables such as a dummy for each state, municipality average per capita income, average temperature mea-

sured by weather station, distance from the electoral section to the weather station, distance to the nearest river and distance to the *cabecera*.<sup>1</sup> Although units on each side of the discontinuity experienced similar rainfall levels, it is important to include these control variables since they are not necessarily geographically located next to each other. Table 1 (see page 5) shows that units in which payments were disbursed are located in wealthier municipalities but all other characteristics do not appear to be statistically different for electoral sections below and above the cutoff. Particularly, the average share of votes for the Presidential incumbent in the previous election – year 2000 – is not statistically different for the two groups.

To get a sense of the way in which observations distribute on each side of the discontinuity we consider Figure 1 (see page 6), which plots the level of rainfall normalized to the defined threshold in each electoral section and the corresponding share of votes for the incumbent in the 2006 Presidential elections. The non-parametric regression line jumps down at the discontinuity suggesting an effect of the drought compensation payment on voting behavior. In order to explore the significance and magnitude of this apparent effect we first specify a linear model of  $f(\text{rainfall}_i)$  and we allow it to vary on either side of the discontinuity.

Table 2 (see page 6) shows the results of estimating Equation (1) using OLS. Column (1) presents the results when no controls are used in the estimation. The coefficient for *cutoff* remains positive and stable as we add co-ntrols. Column (2) shows the estimates when we include a set of dummy variables for each state. Column (3) presents the results when we include also controls at the electoral section level such as altitude, distance from the weather station, distance to

the nearest river and distance to the “cabecera”. Finally, Column (4) presents the estimates when controls at the municipal level are introduced. These specifications indicate a statistically significant effect of government disaster spending on the share of votes for the Presidential incumbent party. The magnitude of the coefficient decreases slightly once we control for the state and the characteristics of the electoral units and municipalities. With the full set of controls, our estimate suggests that receiving drought compensation had an effect of approximately 7.6 percentage points increase in the share of votes for the incumbent party.

Our study builds on the empirical literature about electoral accountability and retrospective voting by providing at least two key contributions. First, we analyze a specific policy that provides indemnity payments to small-scale farmers if the amount of accumulated rainfall within a specific time period falls below an exogenous and pre-established threshold. This allows the use of a quasi-experimental approach – using regression discontinuity design – to credibly identify causal effects of government transfers on electoral results. Moreover, studying the case of the Mexican Weather Indexed Insurance (WII) allows us to compare voter response in areas that have similar and comparable levels of vulnerability. Second, we collected, constructed and use electoral data at the lowest aggregation level: the electoral section. Multiple confounding factors potentially make difficult to identify an effect of disaster spending even with the use of panel data; in our setting these are minimized as we use small units of analysis and compare electoral outcomes of a single election. To the best of our knowledge, this is the first study that exploits the key features of a weather-indexed insurance scheme using GIS methods to produce a complete dataset allowing the empirical test of voter’s response to government disaster spending. Evidence in the context of develop-

1. “Cabecera” refers to the Municipal seat. It generally corresponds to the biggest town in the municipality and the better connected in terms of transportation and information.

ing countries is very limited with the exception of India (Cole, Healy and Werker, 2009). Our findings complement the existing literature and are consistent with the results in previous studies

for the US context (Healy and Malhotra 2009, Chen 2009, Chen 2008) and Germany (Bechel and Hainmueller, 2010).

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**Table 1.** Descriptive Statistics, electoral sections with insurance coverage in 2005

|  | Units WITH compensation | Units WITHOUT compensation |
|--|-------------------------|----------------------------|
| Altitude (meters)                      | 1442.75<br>(43.48)      | 1554.19<br>(23.39)         |
| Distance from weather station (meters) | 1088.12<br>(30.66)      | 1042.5<br>(23.11)          |
| Distance to cabecera (meters)          | 1792.98<br>(96.73)      | 1771.4<br>(123.10)         |
| Distance to nearest river (meters)     | 526.2<br>(35.68)        | 582.88<br>(27.05)          |
| Municipal infant Mortality             | 21.97<br>(0.12)         | 25.33<br>(0.13)            |
| Municipal income per capita (pesos)    | 1821.82<br>(26.97)***   | 1233.51<br>(12.7)***       |
| Number of votes, 2006                  | 617.84<br>(23.06)       | 677.99<br>(11.75)          |
| Share of votes for incumbent 2000      | 32.35<br>(1.08)         | 32.22<br>(0.48)            |
| Number of votes, 2000                  | 619.05<br>(19.69)       | 651.2<br>(9.08)            |
| Observations                           | 305                     | 733                        |

Standard errors for the t-test in parenthesis. Null hypothesis is average characteristic is equal for the two groups. \*\*\* Indicates the null is rejected at 1% confidence level.

**Table 2.** Effect of Drought Relief Compensation on Share of Votes for the Incumbent, Main Results

|                                     | Dependent variable: Share of votes for incumbent in 2006 |                     |                     |                    |
|-------------------------------------|--|---------------------|---------------------|--------------------|
|                                     | (1)  | (2)                 | (3)                 | (4)                |
| Below Cutoff                        | 10.395<br>(1.421)***                                     | 8.211<br>(1.040)*** | 8.332<br>(1.219)*** | 7.69<br>(1.000)*** |
| Rain Deviation                      | -0.078<br>(0.012)***                                     | 0.057<br>(0.015)*** | 0.045<br>(0.018)**  | 0.03<br>(0.018)*   |
| Constant                            | 45.188<br>(0.845)***                                     | 14.38<br>(3.574)*** | -13.398<br>(10.258) | 7.255<br>(9.071)   |
| Observations                        | 1038   | 1038                | 1038                | 1038               |
| R-squared                           | 0.12   | 0.78                | 0.79                | 0.82               |
| State controls                      | No   | Yes                 | Yes                 | Yes                |
| Controls at electoral section level | No   | No                  | Yes                 | Yes                |
| Controls at municipal level         | No   | No                  | No                  | Yes                |
| Mean of dependent variable          | 45.37  | 45.37               | 45.37               | 45.37              |

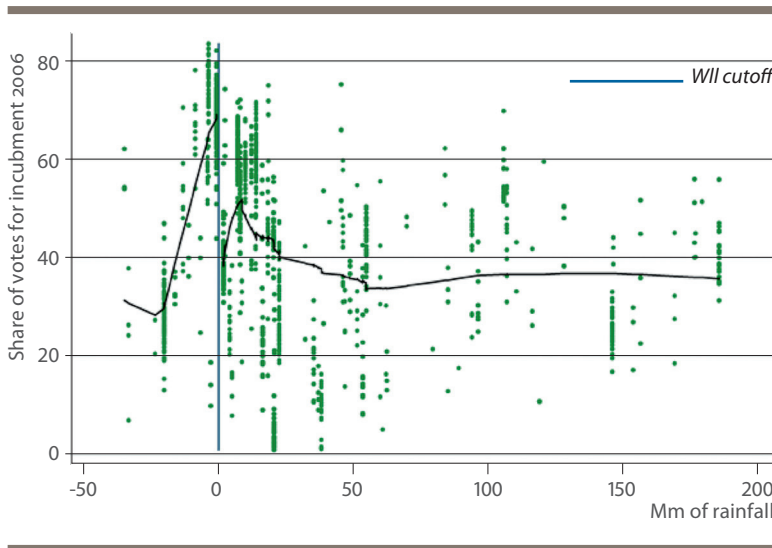
Robust standard errors in parentheses.

State controls are dummy variables for each state. Controls at the electoral sections include altitude, distance from the weather station, distance to the nearest river and distance to the "cabecera". Controls at the municipal level include municipal income per capita for the year 2000.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

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**Figure 1.** Non-parametric graphic analysis, share of votes for the incumbent in electoral sections with insurance coverage in 2005









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