How Lasting is Voter Gratitude? An Analysis of the Short- and Long-term Electoral Returns to Beneficial Policy

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Abstract

Dominant theories of electoral behavior emphasize that voters myopically evaluate policy performance and that this shortsightedness may obstruct the welfare-improving effect of democratic accountability. However, we still know little systematic about how long governments receive electoral credit for beneficial policies. We exploit the massive policy response to a major natural disaster, the 2002 Elbe flooding in Germany, to provide an upper bound for the short- and long-term electoral returns to targeted policy benefits. We estimate that the flood response increased vote shares for the incumbent party by about 7 percentage points in affected areas. 25 percent of this short-term reward carried over to the 2005 election before the gains vanished in the 2009 election. We conclude that, given favorable circumstances, policymakers can generate voter gratitude that persists longer than scholarship has acknowledged so far and elaborate on the implications for theories of electoral behavior, democratic accountability, and public policy.

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Elections incentivize politicians to calibrate policy to voter preferences if voters reward good and punish poor policy performance electorally. The incentivizing effect of electoral accountability crucially depends on voters’ retrospective evaluations. To secure the welfare improving effect of democracy, voters need to remember, evaluate, and reward the policies that incumbents deliver. Yet, many perceive citizens as having a short-lived memory when it comes to political issues and electoral choice (Campbell, Converse, Miller and Stokes 1960; Zaller 1992; Gerber and Green 1998; Lenz 2010; Bartels 2008; Achen and Bartels 2008). The political economy literature (Downs 1957; Nordhaus 1975; Rogoff 1990; Mueller 2003) and studies of economic voting (Fiorina 1978; Cohen and Noll 1991; Lewis-Beck and Paldam 2000; Duch and Stevenson 2006) typically emphasize that myopic voters care only about recent policy benefits and that this shortsightedness provokes inefficient public policy. If electoral rewards for beneficial policy decay rapidly, then reelection pressures induce policymakers to bias policy towards opportunistic short-term solutions and to underinvest in more sustainable long-term efforts aimed at improving overall welfare (Keech 1980; Achen and Bartels 2004; Sobel and Leeson 2006).

Despite the potential gravity of this problem, we know little systematic about the time horizons that voters employ to evaluate policy performance and the durability of electoral rewards for beneficial policy. Precisely how long can politicians and parties expect to earn electoral credit for their past policies? Can massive policy benefits generate voter gratitude that survives long enough to yield electoral rewards in more than one election cycle? While some scholars have begun to explore the possibility of long term rewards for broad economic performance measures such as an increase in real income (Achen and Bartels 2008), we still lack evidence for how long citizens electorally reward more specific beneficial policies.

We address this question by advancing a dynamic perspective on retrospective voting that distinguishes between short- and long-term electoral returns to beneficial policy. Our goal is to estimate a temporal response curve that describes how fast electoral rewards decay over time in an ideal case: voter gratitude with respect to large and concentrated aid and relief spending in the context of a major natural disaster, the 2002 Elbe flooding in Germany. The policies triggered by this natural disaster constitute a fitting natural experiment both because of their timing and the magnitude of the benefits provided. The Elbe flooding occurred only about one
month prior to the 2002 federal election and was the most devastating flood in over a thousand years. It provided Chancellor Schröder and his incumbent Social Democratic party (SPD) with a key opportunity to win over voters through a massive policy response to avert the widely expected defeat in the upcoming election. In response to the flooding, the government swiftly launched the largest disaster relief program ever delivered in German post-war history which included rapid and massive transfers of relief aid to citizens in affected areas.

Using the Elbe flooding as a natural experiment and a difference-in-differences estimation strategy we find that the policy response increased SPD vote shares in the affected regions by about 7 percentage points on average in the 2002 election. These positive returns are consistent with previous studies that have shown significant short-term gains to relief spending in the U.S. context (Healy and Malhotra 2009; Lay 2009; Chen 2010; Chen 2008). Our estimates imply that the relief spending increased votes for the SPD government at a price of about €63,000 per vote in the 2002 election. Turning to the longevity of the electoral rewards, we find that about 25 percent of the massive short-term electoral return carries over to the next election in 2005. Compared to the 1998 baseline, the SPD received 2 percentage points more votes in the affected regions in the 2005 federal election than it would have received without the flood response. This suggests that voters still rewarded the government even several years after the flood. The price of an additional vote in the regions affected by the flood decreased to about €48’600 on average. We find no electoral gains in the 2009 election, the estimate of the electoral returns are small and not significant at conventional levels. Thus, after seven years, the flood response seems to have entirely vanished from the retrospective evaluations of voters in the affected areas.

Our temporal perspective on the electoral rewards reveals that voter gratitude can last several years, longer than myopic retrospection would lead us to expect. At least in an ideal case scenario policymakers can generate electoral returns that persist considerably longer then previous scholarship has acknowledged. In the conclusion we elaborate on the implications of our findings for theories of voter behavior, democratic accountability, and public policy.
Myopic Retrospection? Short- and Long-Term Electoral Returns to Disaster Relief Aid

Our analysis of the short- and long-term electoral returns to disaster relief aid builds on the electoral accountability literature and previous work on retrospective voting. Numerous studies have considered the short-term electoral returns to policy benefits. In the economic voting literature, many studies have demonstrated that retrospective voters reward incumbents for good economic performance in the short run (Duch and Stevenson 2006; Clarke, Stewart and Whiteley 1998; Fair 1996; Lewis-Beck 1986; Kirchgässner 1985). A more recent strand of literature examines the electoral rewards for specific beneficial policies such as federal transfers and disaster relief spending. Levitt and Snyder (1997) present evidence for electoral returns to federal spending in U.S. congressional elections. An increase of $100 per capita in spending yields a two percent increase of the popular vote. In an early study, Abney and Hill (1966) examine voter reactions to a large rescue and relief program in response to Hurricane Betsy, which triggered a disastrous flooding in southeastern Louisiana. They consider the 1965 New Orleans mayoral election and find that the incumbent mayor lost votes in both affected and unaffected precincts to an almost equal extent, despite prompt relief spending. Healy and Malhotra (2009) explore how voters incentivize incumbents to invest in disaster preparedness and relief policies in the U.S. and find that citizens only reward disaster relief spending. This explains why governments typically underinvest in economically more efficient preparedness measures while providing substantial, yet economically less efficient, relief aid. Chen (2010) finds that disaster relief aid provided in the aftermath of the 2004 Florida hurricane season increased George W. Bush’s vote share in the 2004 Presidential election in Republican precincts, but failed to boost Bush’s vote share in Democratic precincts.

These studies demonstrate that voters reward incumbents for government transfers, but they focus almost exclusively on short-term rewards and leave open the question of whether such beneficial policies can built more lasting electoral support. Some studies have begun to explore potential long-term rewards for macro-economic performance. For example, Achen and Bartels (2008) argue that changes in real income in election years can add to long-term partisan realignments (see also Mayhew 2002). But we still know very little about potential
long term rewards for more specific beneficial policies such as government transfers.

From a standard rationalist perspective citizens may have little reason to become deeply informed about political matters and to keep this information in their long-term memories as holding governments accountable constitutes a public good. Individuals may use heuristics to minimize the costs of becoming informed about political issues and the incumbent’s competence. Lenz (2010) argues that retrospective policy evaluations follow a cost-reducing “peak-and-end” heuristic known from experimental psychology (Langera, Sarin and Weber 2005; Fredrickson and Kahneman 1993), in which the event associated with the highest utility level and the final event in the election cycle most strongly affects voters evaluations. In line with this argument, Bartels (2008) finds that in the U.S. Republican administrations have provided income growth at the time of elections to cater to short-sighted voters, who appear to pay attention only to the last quarter of economic performance before the election.

If retrospective judgement follows the “peak-and-end” rule, then voters should receive the highest utility from very intense, extremely targeted beneficial policies and these should generate the most pronounced and durable electoral rewards if incumbents deliver them immediately prior to the election. Disaster relief in response to natural disasters constitutes a prime example of particularly concentrated, beneficial policies that receive strong public attention. Moreover, compared to standard redistributive programs or the income effects of economic growth, relief spending is temporally and geographically highly concentrated and strongly directed towards affected individuals.1

Thus, although disaster relief spending may produce large imminent electoral gains, the idea of short-sighted, forgetful voters that suffer from an end bias in their retrospective evaluations implies that citizens heavily downweight government transfers provided in the more distant past. But so far we still lack systematical evidence on how quickly electoral rewards for beneficial policy abate. Manacorda, Miguel and Vigorito (2009) provide a first step in this direction. They find that government transfers as part of a large anti-poverty program in

1Therefore, governments will rationally favor relief over preparedness spending, because it is more targeted, more publicly observable, attracts more media attention, can more easily be temporally attributed, and appears more attractive to short-sighted, forgetful voters (Healy and Malhotra 2009). See Cohen and Werker (2008) and Kuhn (2005) for studies that focus on how democratic institutions and international disaster aid affect the level of disaster preparedness.
Uruguay increased political support for the incumbent government and that slightly smaller gains in electoral support persisted at least until about three months after the transfers stopped. But a more comprehensive test requires an examination of a longer horizon to accurately estimate the rate at which electoral rewards for government transfers decay over time.

Below we provide such a test by considering the short- and long-term electoral rewards to the massive relief spending triggered by the 2002 Elbe flooding in Germany. By estimating the rate of decay of the electoral returns to disaster aid, we deliver first empirical evidence for whether beneficial policies can build lasting electoral support. From the perspective of the “peak-and-end” rule this case provides an ideal setting for exploring the possible upper limits to long-term electoral rewards, since the government provided large, concentrated benefits right at the end of the electoral cycle. Since the policy response was both “peak” and “end”, it should have had the highest probability of becoming entrenched in individuals’ longterm memories. If voters forget quickly about such profound and extremely cost-intensive programs, then presumably the long-term electoral rewards for more standard policies deteriorate even more rapidly.

The Elbe Flooding and the Incumbent’s Policy Response

We now turn to the empirical estimation of the electoral rewards to policy benefits and their rate of decay by analyzing the effects of massive disaster relief provided in the context of the 2002 Elbe flooding. Prior to the Elbe flooding, citizens had little reason to reelect the incumbent government led by Chancellor Gerhard Schröder in the federal election in September 2002 (Falter, Gabriel and Weßels 2005; Arzheimer and Falter 2005; Schoen 2004; Roberts 2003; Rohrschneider and Fuchs 2003; Schoen 2003). During his 1998 electoral campaign, Schröder had promised to reduce unemployment below 3.5 million until 2002 and explicitly demanded that citizens should vote him out of office if he failed to achieve this target. But by early 2002 unemployment had increased to 4.3 million, an increase of 300,000 since the start of Schöder’s term. Moreover, macroeconomic forecasts provided little reason to believe in a quick recovery of the weakening economy. Adding to the frustration over the weakening economy, Schöder also promised to implement the reform proposals by the Hartz commission including a
series of highly unpopular labor market reforms. Unsurprisingly, chancellor Gerhard Schröder’s Social Democratic Party (SPD) and his coalition partner, the Greens, were lagging in the polls (Hogwood 2004). Many expected the conservative Christian Democratic Party (CDU) together with the Liberals (FDP) to oust the Schröder government in a landslide in the upcoming elections in September 2002 (Hogwood 2004).

A series of unprecedented rainfalls, which began in early to mid August and peaked around the 12th to 13th, caused the Elbe river to trigger the worst flood in modern German history. By August 17th the Elbe river reached an all-time high of 9.4 meters in Dresden, the highest mark ever recorded. From a hydrological perspective, floods with such severity occur only once every 500 to 1,000 years (IKSE 2003). The left panel in figure 1 displays a map of all 299 electoral districts in the 2002 election. All electoral districts that were directly affected by the flood are highlighted in dark gray. The affected districts cluster along the Elbe river and extend from the area south of Hamburg all the way towards the border with the Czech Republic in a south-eastern direction.\(^2\)

In sum, the affected regions suffered 21 casualties and more than 30,000 people had to be evacuated. The best available estimates indicate that the economic damage from the flood exceeded €15 billion (Mechler and Weichselgartner 2003; Bundesministerium der Verteidigung 2002). This damage compares in size to that caused by the 1999 earthquakes in Turkey and amounts to more than 50 percent of the damage from Hurricane Andrew and approximately 12 percent of the estimated damage from Hurricane Katrina (Sawada and Shimizutani 2008). In Dresden, one of the most affected cities, the local damage amounted to €400 millions, equaling 47 percent of the annual municipal budget of 2002. In the Sachsen region the flood damage amounted to about 42 percent of the annual regional budget of 2002 (Mechler and Weichselgartner 2003).

While the flood caught all parties by surprise, it fundamentally changed the dynamics of the campaigns for the upcoming elections (exogenously) scheduled for September 22 in ways particularly important from the perspective of our theory.\(^3\) The incumbent SPD immediately

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\(^2\)The precise coding for the affectedness indicator is described below.

\(^3\)Federal elections in Germany are exogenously fixed (see article 39 of the German constitutional law). Exceptions are early elections due to a motion of no confidence. The 2002 election was a regular election, however.
capitalized on the opportunity and swiftly initiated a massive policy response that lasted well
until election day. Right after the first flood reports came in, Minister of Defense Peter Struck
(SPD) rushed to visit the affected areas and publicly announced that the German forces will
do everything they can to help (Bundesministerium der Verteidigung 2002, 21). By August 20,
only three days after the Elbe had reached an all-time high in Dresden, the government had
already sent about 45,000 soldiers to serve in the affected regions, stabilizing dams, evacuating
people in danger, and coordinating the disaster response. It was the largest military (disaster
relief) operation ever carried out by the German military forces since World War II. The
German forces continued their operations until mid September to help with clean-up and
reconstruction work of post-war proportion.

In addition to sending the troops, Chancellor Schöder quickly announced an emergency
program in mid August that provided €385 million disaster relief aid. The first payments
went out only two days later (Hogwood 2004, 254). They included immediate payments of
€500 per affected person (max €2,000 per household) and €5,000 per affected residential
property building. Affected businesses were paid €15,000 and €500 per employee (Mechler and
Weichselgartner 2003, 31). Moreover, the incumbent SPD-Greens coalition initiated legislation
that promised even more disaster relief aid. On August 26, it introduced a “Flood victims
solidarity” bill (Flutopfersolidaritätsgesetz) backed up by a €7.1 billion disaster relief fund,
the largest amount ever spent in the context of a natural disaster in German history.4

The disaster relief fund started to disburse payments to voters almost instantly following
the passage of the bill (Mechler and Weichselgartner 2003; Hogwood 2004). By the time that
affected voters came to the polls many of them had already received direct support payments
from the government. Overall, the relief fund compensated 78 percent of the direct dam-
age from the flood, a proportion that by far exceeds historical standards for similar disasters
(Mechler and Weichselgartner 2003, 37).5 Although all parties and candidates unequivocally

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460 percent of the fund was disbursed in 2002, the rest in 2003. The relief fund did not cover costs arising
from the military operation.

5International data on financial compensation for disaster damage suggests that the average financial compen-
sation across all major floods and earthquakes recorded in the 1990-2000 period amounted to about 45
percent of the recorded losses, the maximum compensation in the same period was 57 percent in the case of
the 1997 flooding in Poland (Linnerooth-Bayer and Quijano-Evans 2003; Mechler and Weichselgartner 2003).
supported the flood response, the flooding unmistakably highlighted a simple, yet crucial difference between incumbent and challenger: “Schröder had access to federal funds and the means to reallocate them: Stoiber did not” (Hogwood 2004, 254).

The incumbent SPD/Greens government was reelected in the 2002 federal election, but their majority in parliament was slim: 302 seats were required for a majority in parliament and the incumbent SPD/Greens government received 306 seats (SPD: 251 seats, Greens: 55 seats). In fact, the election outcome was so close that based on the first projections challenger Edmund Stoiber announced that he and his coalition consisting of the CDU, CSU and the Liberals had won the election (von Alemann 2003, 58).

Empirical Estimation of the Short- and Long-term Rewards to Disaster Relief

Measurement

Our units of analysis are electoral districts, the lowest level at which vote shares are publicly available for federal elections. In order to generate conservative estimates of the electoral returns to the flood response we consider a binary treatment indicator, called Flooded, that measures whether an electoral district was directly affected by the Elbe flood and the associated disaster response. In particular, this variable takes the value of zero for unaffected districts and the value of one for electoral districts that experienced at least one of the following events: stabilization or breach of levees, flood warning, over-topping of levee, flooding, evacuation warning, or evacuation. We include flood damage that occurred from the Elbe as well as its major flooded tributaries wherever damage occurred. We coded this measure based on information from a detailed report on the Elbe flood published by the International Commission for the Protection of the Elbe River (IKSE 2003). We also cross-checked our coding using the less detailed report on the Elbe flood published by the State of Sachsen (Sächsisches Landesamt für Umwelt und Geologie 2002).

Figure 1 displays the treated electoral districts and the Elbe river as well as its tributaries. The flooding affected 29 districts, all but two of them are located in East Germany. The

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6As is commonly the case for floods of this severity, some of the most disastrous damage resulted from smaller tributaries such as the Müglitz, the Gottleuba, or the Mulde (IKSE 2003). We therefore include these flooded tributaries in our coding.
detailed list of affected districts is provided in the appendix.⁷

**Identification of the Short- and Long-term Electoral Rewards**

The empirical analysis relies on an difference-in-differences strategy to identify the short-term and long-term electoral rewards for the policy response to the 2002 Elbe flood. Let there \( i = 1, ..., N \) denote electoral districts that are observed for elections in years \( t = 1994, 1998, 2002, 2005, 2009 \). Let \( D_{it} \) be our binary *Flooded* indicator that is coded one for districts that are directly affected by the flood between the current and the previous period and zero otherwise. Our outcome of interest is the SPD’s proportional representation (PR) vote share in a given district. Let \( Y_{{dit}} \) denote potential outcomes, where \( Y_{{1it}} \) and \( Y_{{0it}} \) indicates the pair of potential vote shares that the SPD attains in district \( i \) at time \( t \) when exposed to the treatment or the control condition between the current and the previous period.

Our first quantity of interest is the short-term electoral effect of the flood response which we define as the average treatment effect on the treated (ATT) given by \( \alpha = E[Y_{{1it},2002} - Y_{{0it},2002}|D_i = 1] \). This estimand measures the average difference between the post-treatment vote shares that the affected districts attain with and without the treatment. Since we do not observe \( E[Y_{{0it},2002}|D_i = 1] \), we identify this missing potential outcome based on the usual difference-in-differences assumption of parallel trends. Specifically we assume, \( E[Y_{{0it},2002} - Y_{{0it},1998}|D_i = 1] = E[Y_{{0it},2002} - Y_{{0it},1998}|D_i = 0] \), which says that in the absence of the flood, the average SPD vote share in the affected districts would have followed a similar trend than the average SPD vote share in unaffected districts. Based on this assumption the ATT is identified

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⁷Notice that other studies have used more direct measures such as state or even precinct level relief spending (Chen 2010; Chen 2008; Healy and Malhotra 2009). Unfortunately, such data is unavailable in our context. We have contacted the Ministry of the Interior, the Ministry of Defense, and also the Treasury and all report that district-level data on relief spending no longer exists. We have also re-estimated our models using a more fine-grained treatment measure that further distinguishes between affected and strongly affected districts. Districts were coded as affected if they experienced a flood warning, stabilization of levees, or were mentioned as being relatively mildly affected by the flood as reported in the official report (IKSE 2003). We coded districts as strongly affected if they were mentioned to have experienced a breached levee, flooding, or evacuation. The results are substantively identical to the ones presented here with electoral rewards being significantly higher in more strongly affected districts. For transparency reasons we use the simpler binary measure for our main analysis below.
from observed outcomes as

\[ \alpha = \left\{ E[Y_{i,2002}|D_i = 1] - E[Y_{i,1998}|D_i = 1] \right\} - \left\{ E[Y_{i,2002}|D_i = 0] - E[Y_{i,1998}|D_i = 0] \right\}. \]

We estimate \( \alpha \) using a standard fixed effects regression given by

\[ Y_{it} = \beta_0 + \eta_i + \delta_t + \alpha D_{it} + X_{it}' \beta + \varepsilon_{it}, \]

where \( \beta_0 \) is a constant, \( \eta_i \) is a district level fixed effect to control for any time-invariant unobserved factors, \( \delta_t \) is a period fixed effect to control for common trends, \( \alpha \) is the treatment effect, \( X_{it} \) is a vector of time-varying covariates (assumed to be unaffected by the treatment), and \( \varepsilon \) is an idiosyncratic error term with \( E[\varepsilon|\eta,\delta,D,X] = 0 \).

To account for potential serial correlation and heteroscedasticity we cluster the standard errors by district. In order to avoid potential post-treatment bias, we present the main results with and without including our time-varying covariates since the covariates may be affected by the treatment itself, thereby inducing post-treatment bias. Notice that the districts underwent some redistricting between the elections. In particular, between 1998 and 2002 the number of districts was reduced from 328 to 299 districts. Between 2002, 2005, and 2009 the number of districts has remained at 299, but a few districts’ borders were redrawn. We have adjusted all covariates and outcome variables for this redistricting for all the regressions.\(^8\) In addition to the short term effects of the flood response, we are also particularly interested in the long-term electoral rewards to establish an upper bound of the longevity of voter gratitude for massive policy benefits. We identify the long term effects using similar difference-in-differences regressions to estimate the differential vote share trends between affected and unaffected districts comparing the 1998 to the 2005 and the 2009 election.

\(^8\)This adjustment uses two sources. For each pair of subsequent elections, the Federal Election Commission (FEC) releases vote results based on the current and previous district geography. This data is used to examine short-term changes in vote shares. To include covariates and to examine changes in vote shares beyond the subsequent election we spatially re-weight the covariates and votes from election to election using GIS district border shape files that the FEC provided to us for every election since 1994. We split the districts into non-overlapping polygons across elections and then recompute the covariates and votes on the basis of the 1998 borders using area-weighted averages. We also cross checked the reweighted vote shares against the vote share data that the FEC releases for each election pair and the results matched up closely. Overall the redistricting has little effect on vote results, since legal constraints prevent gerrymandering and redistricting decision are made by an independent electoral commission (see §3, paragraph 3 of the German federal election law).
To probe the plausibility of our identification assumption we conduct a falsification test and estimate a placebo difference-in-differences regression with a similar specification for the 1994 to 1998 pre-flood period. This is an important test to check whether the affected and unaffected districts followed similar trends prior to the flooding.

**Falsification Test for Pre-Flood Period**

Model 1 in table 1 contains the results from our falsification test. To probe our identification assumption of parallel trends in the absence of the treatment, we run our difference-in-differences regression for the pre-flood period (the 1994 and 1998 election). We find that SPD PR vote shares in the affected and unaffected districts follow a virtually identical trend prior to the Elbe flood. The SPD on average gains about 4.6 percentage points nationwide, but this increase is identical in treated districts that are eventually flooded in 2002 and control districts that are not directly affected by the 2002 flood. The placebo effect estimate is almost exactly zero (−.00), and the 95 percent confidence interval ranges from [−.6,.6] percentage points of vote share. This strikingly parallel trend of SPD vote share in both groups in the pre-flood period increases the confidence in our identification assumption. Given the parallel trend in the pre-flood period it seems plausible to assume that, in the absence of the flood, the group of affected and unaffected districts would have continued on an approximately parallel trend in the post-treatment period. As we demonstrate below, after several years treatment and control group return to their pre-treatment parallel trends. This further increases our confidence in the difference-in-differences estimation strategy we employ.

**Short Term Electoral Returns to the Flood Response**

Models 2-4 in table 1 show our difference-in-differences estimates for the short-term electoral rewards for the flood response as measured by the increase in SPD PR vote share from the 1998 to the 2002 election. Model 2 presents the benchmark fixed effects equation. We find that the flood response increased the SPD vote share by a precisely estimated 7.1 [6.4,7.9] percentage points on average in the flooded districts. This effect is not only highly statistically significant (with a t-statistic of about 15), it is also large in substantive terms. Compared
to the overall SPD PR vote share of 38.5 percent in 2002, the flood effect constitutes about an 18 percent vote share increase. While the SPD lost about 3 percentage points on average in unaffected districts, it experienced strong gains of about 4 percentage points in affected districts. This indicates that voters in the affected areas strongly rewarded the SPD for its swift flood response.

How robust is this short-term electoral gain? In model 3 we add a large set of time-varying covariates to the benchmark fixed effects equation to account for changes in observed district level characteristics. Our set includes controls for socio-demographic shocks such as population density, population outflows, the share of foreigners, and the share of elderly voters. We also include a battery of controls for economic voting including the unemployment rate and employment shares for different sectors of the local economy. Finally, we include a dummy that measures whether the SPD is the majority party in the state government. This control is added to account for the well-known interaction between federal and state elections (Kern and Hainmueller 2006; Kedar 2006; Kellermann 2008). In particular, we may expect that the SPD attains lower levels of vote shares in districts where it attained control of the government at the state level. The flood effect is robust to including these covariates; the results are virtually identical.

In model 4 we estimate a first-differenced equation that also adds the lagged PR vote share of the SPD as an additional control and the flood effect estimate remains again unchanged. As an additional robustness test, we also checked that the results are robust to using a the non-linear changes-in-changes (CIC) model developed in Athey and Imbens (2005). Using this model, the short term electoral return to the flood response is if anything slightly stronger; SPD vote shares increase by about 9 percentage points on average and this effect is also consistent across different quantiles (about 11 percentage points at the 1st quantile and 6 percentage points at the 3rd quantiles).

Taken together, these results indicate that the SPD experienced a large vote share increase in flooded districts. However, the regressions still leave open the possibility that the increase in vote share was caused by changes in unmeasured confounding factors that affected SPD vote

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9 The appendix provides a complete covariate list and their sources.
shares differently in flooded areas. One way to rule out such differential trends in unobserved confounders is to examine trends in SPD popularity in the pre-flood period. Changes in unobserved factors that are powerful enough to influence vote shares should be picked up in the popularity data. Figure 2 shows the popularity trends for both major parties (based on the Forsa poll, the largest available representative opinion survey with about 2,500 respondents per week). For each pre-election month in 2002, we estimate the percent of voters that intend to vote for the SPD (left panel) and the CDU/CSU (right panel) in an upcoming election. We find that both the SPD and CDU/CSU experienced broadly similar popularity trends in flood affected areas and unaffected areas throughout the entire pre-flood period. In July, the last month before the flood onset, the SPD popularity is virtually identical in both groups. However, with the onset of the flood response in August the SPD gains popularity overall and these popularity gains are much stronger in flood affected areas. For the CDU/CSU we find the same pronounced pattern, but in the opposite direction. This result strongly suggests that the excess SPD gains in the affected areas are attributable to the positive effect of the flood response and cannot be accounted for by differential trends in unobserved confounders (unless they happen to coincide with the flood and differentially impact affected and unaffected areas). The only plausible alternative may be a powerful campaign issue that much more strongly resonated with voters in affected areas, a possibility that we further rule out below.

Long-Term Electoral Returns to the Flood Response

So far our results suggest that the flood response produced large and highly significant short-term electoral returns in affected districts. How persistent are these rewards in vote share for the incumbent government? In order to assess the long-term electoral returns to the flood response we estimate similar difference-in-differences regressions comparing the gains in SPD vote share in affected and unaffected districts between the 1998 and 2005 election. Given the assumption of short-sighted voters and the fact that the 2005 election occurred three years after the flood, we would not expect to see lasting rewards for the SPD in affected areas.

In contrast to this expectation, we find significant and robust long-term rewards. Model

\footnote{We used the so called “Sonntagsfrage” from the Forsa data set. This data is available at GESIS – Leibniz Institute for the Social Sciences, dataset identification code ZA3909.}
5 in table 1 shows the estimates from the benchmark fixed effects specification. We find that the SPD PR vote share increases by about 2 percentage points on average in directly affected districts. This indicates that about 25 percent of the short-term electoral gain generated by the SPD’s flood response carries over to the 2005 election. As can be seen in models 6 and 7, this remaining long-term effect is robust to the inclusion of our time-varying covariates and also the lagged vote shares. This evidence suggests that at least in an ideal case scenario such as the massive, targeted benefits provided by the policy response to the Elbe flooding, politicians may be able to reap more lasting rewards from voters for beneficial policies.

In models 8-10, we consider whether the rewards carry over to the 2009 election. According to the benchmark specification in model 8, the SPD still enjoys a small, and statistically significant advantage of 1.3 percentage points of vote share in affected areas. However, this effect is further reduced in magnitude and even becomes insignificant once we enter our time varying covariates in model 9. In the most comprehensive model 10 with all covariates and lagged vote shares the SPD gain is further reduced to a .7 percentage points and we no longer have sufficient precision to reject the null at conventional levels (p-value = .15). Overall, these findings suggest that in this second election that occurred seven years after the flood, the electoral returns further decline and indistinguishable from zero.

Figure 3 summarizes the overall dynamics of how the electoral returns decay over time. The upper panel shows the trend in vote shares in affected and unaffected districts over the entire period from 1994 to 2009. The lower panel maps out the covariate adjusted return estimates with their 95 percent confidence envelopes for each of the periods. Starting from almost perfectly parallel trends in the 1994 to 1998 period, the flood response induced large short-term gains in the 2002 election. About a quarter of this return carries over to the 2005 election when the SPD still exhibits excess gains in the affected areas. By 2009, however, the effect is almost faded and the two groups return to their parallel dynamics as experienced in the pre-flood period. This return to parallel trends additionally lends confidence to the results, as it suggests that the flood response affected vote choice in two following elections, but was not associated with other fundamental changes that would make affected and unaffected districts incomparable in the long run.
To gain an impression of the short- and long-term electoral returns that explicitly takes into account the massive government transfers, we computed the short- and long-term returns to disaster relief spending and the price of one additional vote in the affected regions. These figures are based on our findings and information about the absolute number of SPD votes in the affected districts. Using the 7 percentage points estimate for our treatment measure and the €7.1 billion size of the disaster relief fund, we can say that the short-term electoral return to the federal incumbent’s disaster spending efforts in the affected regions equaled a one percentage point SPD vote share increase per one billion euros. This means that for every billion spent on disaster aid the incumbent party received about 16’300 additional votes; the average price per vote in the affected regions equals about €61’300 in 2002. Once we take the long-term rewards into account, the vote share gain in flooded regions equals about 9 percentage points, which yields an electoral return of about 19’800 additional votes per billion euros spend on disaster relief. This implies that the price of one vote in the affected regions decreased to €48’600 on average.

These prices slightly exceed those reported in Healy and Malhotra (2009) and Chen (2010) whose price estimates are based on more disaggregated relief spending data. Healy and Malhotra (2009) estimate that about $27,000 in relief spending buys one additional vote and Chen (2010) reports that in the aftermath of the summer 2004 hurricane season, between $12,000 and $37’500 in disaster relief aid generated one additional vote for George W. Bush.

Electoral Returns in Affected Regions and the Role of the Iraq Issue

Most of the affected districts were located in East Germany. This spatial clustering of vote gains in East Germany sets the stage for a rival argument. Some analysts have claimed that two issues dominated the 2002 election campaign, the Elbe flood and the question about whether Germany should take part in the US-led war on Iraq (Schoen 2003). But in order to account for our findings, the Iraq issue must have had (1) a large positive effect on SPD votes and (2) this effect must have exhibited strong heterogeneity in the sense that its size or sign varied systematically between flood affected and unaffected districts. The evidences suggest that neither of these two criteria is likely to be met empirically.
Schröder publicly opposed the war on Iraq, but this stance was in line with the large majority of voters all across Germany. More importantly, the evidence strongly suggests that the Iraq issue played almost no role for voters in the affected regions compared to the Elbe flood response. The upper panel in figure 4 examines the relative importance of these two issues to voters in East Germany. For each month we plot the fraction of respondents in East Germany that perceive the Elbe flood or the Iraq issue to be among the three “most important current problems.” The results indicate that the Elbe flood was clearly the dominating issue in the 2002 election. The flood issue started to surge rapidly in August, the month prior to the election, when about 15 percent of the respondents in East Germany perceived the Elbe flood to be among the three most important current problems. In that same month, only about 1 percent of the respondents reported that the Iraq war belongs to the three most important problems, suggesting that the Elbe flood and the incumbent’s political response to it was the far more important issue, and in turn, crucial for citizens’ electoral choice. The lower panel of figure 4 replicates the analysis using a broader definition of the two issues as a robustness check and the conclusions remain unchanged.

Finally, we find a pronounced spatial gradient in the electoral rewards. In figure 5 we plot the partial deviance residuals from a General Additive Model (GAM) that orthogonalizes the 1998 to 2002 SPD PR vote share gains to our full set of covariates and a (back-fitted) smoothing spline for the distance to the Elbe River. The plot shows the average residual vote share gains (with twice standard error confidence envelopes) as a function of the distance. Directly flood affected districts (Flooded = 1) are highlighted in black. The right figure shows the same plot with superimposed local linear regressions lines that visualize the conditional relationship between residual SPD vote gains and the distance to the Elbe within each of the Land regions that have at least one directly affected district.

The results clearly suggests that the vote gains vary by distance to a flooded area even

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11 Here we include respondents that mention one of the words “flood”, “damages from flood”, or “how to finance flood damages” for the Elbe issue and the words “discussion about war on Iraq”, “US operations against terror”, or “Iraq war” for the Iraq issue.

12 Here we include respondents that mention the words “flood”, “damages from flood”, “how to finance flood damages”, “climate and natural disasters”, or “environmental policy” for the Elbe issue and the words “discussion about war on Iraq”, “US operations against terror”, “Iraq war”, “foreign policy”, “war and conflict in general”, or “wars in the world in general” for the Iraq issue.
within states in East Germany. We would not expect this pattern if the Iraq issue had moved voters and thus triggered the vote gains we document. Clearly, the spatial gradient seems hard to square with the idea that voters were moved by foreign policy issues in a period in which the worst flood in a thousand years destroyed their homes and threatened their lives. Such a spatial relationship is, however, what we would expect if the policy response to the response to the Elbe flood caused the electoral returns we document. Notice also that the spatial gradient of the vote gains suggests that our estimates of the short- and long-term electoral rewards are if anything conservative. Our definition of directly affected districts leaves some districts in the control group that may actually be indirectly affected by positive regional spillovers that arise from the fact that voters who live closer to the directly affected areas may be more likely to reward the SPD electorally for the flood response.\footnote{Voters that are geographically close may indirectly benefit from the flood aid or feel a sense of solidarity with citizens in directly affected areas. We leave it for future research to systematically explore such spillover effects.}

To the best of our knowledge there were no other policies prior to the Elbe flooding that specifically provided government transfers to districts that later were affected by the flood in the 1998 to 2002 period, thereby potentially generating the vote gains we find. Moreover, monthly polling data shows that the incumbent’s popularity in affected regions was actually always lower than in non-affected regions in the months before the Elbe flooding occurred in August 2002 (see figure 2). But directly after the flooding set in we observe a massive jump in the incumbent’s popularity in affected regions, leading popularity levels to exceed those in non-affected regions for the first time in 2002. This timing of events suggests that the flood and the policy response caused the electoral rewards and not some other policy that the incumbent had enacted earlier.\footnote{We also explored the monthly popularity ratings of the two candidates running for Chancellor and found exactly the same pattern.}

**Persuasion or Mobilization**

Two mechanisms can potentially explain the increase in SPD vote shares. First, the flood response may have persuaded voters who were already going to turn out to switch their vote to the SPD. Second, the flood response could have mobilized individuals who would have
otherwise abstained to turn out for the SPD. Figure 6 plots the estimated fraction of eligible voters that intend to turn out in the election throughout the pre- and post-flood periods. The time series almost perfectly follow parallel trends in affected and unaffected areas throughout the flood period. This pattern is consistent with the argument that the flood response affected SPD vote shares primarily through a persuasion effect, rather than through mobilizing voters that would have otherwise abstained. Figure 7 provides further evidence for a persuasion effect. In the left panel, we plot the proportion of citizens that intend to vote for the SPD among its former supporters (defined as the group of voters that report having voted for the SPD in the 1998 federal election). Throughout the pre-flood period only about 75 percent of these former SPD voters still intend to vote for the SPD which indicates that the party had lost grounds among its traditional voter base. Both time series again evolve similarly in affected and unaffected areas before the flood sets in. Following the flood onset, however, the SPD rapidly wins back voters and these gains are considerably stronger in affected as compared to unaffected areas. This suggests that the swift flood response stemmed defection of former SPD voters and persuaded them to turn out for their party again (as opposed to voting for another party). Finally, the right panel in the figure plots the fraction of former CDU/CSU voters that intend to vote for the SPD. We find similar differential SPD gains amongst this group, indicating that the flood response also won over a significant number of former CDU/CSU supporters, which clearly hints at a persuasion effect.\footnote{An examination of the changes in vote shares further corroborate these findings from the polling data. We regress CDU/CSU vote shares on all covariates using the benchmark model and find that the major opposition party lost about 2.4 [3.4, 1.4] percentage points on average in the flooded districts. Apart from winning over potential CDU voters, the SPD’s massive flood response effort may have also swayed some PDS voters from the left of the political spectrum, since the socialist party is a fierce competitor for the SPD in many of the affected districts. Again using the benchmark model we estimate that the PDS experienced even higher losses than the CDU/CSU of about 3.6 [4.4, 2.8] percentage points in the flooded districts.\footnote{We find no significant vote share gains for the Greens, the SPDs smaller coalition partner, presumably}}
together, these results indicate that the flood response increases SPD voter shares mainly through persuasion, rather than mobilization of new voters.

The extent to which the policy response generated the electoral rewards through persuasion and/or persuasion may affect their durability. Given that non-voters have no or at best weak long-term partisan attachments, massive policy benefits may fall on more fruitful grounds to build lasting support when they mobilize individuals that originally intended to abstain. In contrast, if the policy response induces citizens that identify with an opposition party to vote for the incumbent (persuasion), we would expect these voters to face stronger incentives to return to their original party in subsequent elections. This issue may provide an interesting starting point for further research.

**Conclusion**

Dominant theories hold that voters have extremely short-lived memories when it comes to political issues and electoral choice, but we still know little systematical about how quickly electoral rewards for beneficial policies decay over time. Generating better knowledge about this topic is important, because the shortsightedness of myopic voters can induce reelection seeking incumbents to opportunistically skew policies towards short term goals. Our study addresses this gap and tries to identify an upper bound for the time horizons that voters employ to evaluate policy performance in an ideal case scenario. By exploiting the massive policy response to the 2002 Elbe flooding in Germany as a natural experiment, we seek to pinpoint how long voter gratitude for beneficial policy can possibly last. Theory suggests that our estimates provide a possible upper limit to long-term electoral rewards, since the policy response provided large, concentrated benefits right at the end of the electoral cycle. Because the policy benefits were both “peak” and “end”, they should have enjoyed an exceptionally positive place in voters’ longterm memories, therefore generating especially lasting electoral because the flood response was SPD dominated. The SPD held all key ministries that led the flood response (Defense, Interior, and the Treasury). The finding also supports Tucker’s (2006) “junior coalition member” hypothesis, which holds that junior members of a coalition governments tend to receive less rewards for government transfers than their senior coalition partners. Moreover, the Greens are traditionally very weak in the East were most of the flooded districts are located. We also find no significant losses for the FDP. Finally, we considered whether the policy response affected SPD Single Member District votes and find that SPD candidates gained about 3 [1.8,4.2] percentage points in flooded districts.
rewards.

Consistent with earlier studies from the U.S. context, our results indicate that the short-term electoral rewards to beneficial policy are considerable. We find that vote shares for the incumbent SPD party increased by 7 percentage points in directly affected areas and that persuasion presumably drives these vote gains. Even more importantly, we find that 25 percent of the short-term electoral rewards carry over to the 2005 election. This demonstrates that voter gratitude can persist several years and perhaps longer than is commonly believed. We do not find a significant vote gain in the affected regions in the 2009 election. These findings do not only add to our knowledge about the electoral effects of natural disasters, but also carry implications for our understanding of voter behavior, democratic accountability, and public policy.

Myopic retrospection predicts strong electoral rewards to massive policy benefits, but since voters tend to forget quickly and only consider what the incumbent has done for them lately, these rewards to massive disaster relief will be very short-lived, and certainly not to survive several years. The durability of the electoral rewards we document constrain the scope of this theory. Voter gratitude for policy benefits can last longer than we would expect from the myopic voter, at least when it comes to massive policy benefits such the ones we consider here.

Our results also speak to the blind retrospective voting, since we find that the incumbent party experienced strong gains in flooded districts, where it provided massive aid to citizens, and substantial losses in distant, unaffected districts. This suggests that affected voters did correctly attribute responsibility for these policies to the government and rewarded the incumbent for its response instead of blindly punishing government officials for the occurrence of the flooding. These findings for the short-term electoral rewards are consistent with earlier studies from the U.S. context (Healy and Malhotra 2009; Chen 2010; Chen 2008) and India (Cole, Healy and Werker 2009), which indicates that they potentially generalize to disaster events in other countries. Thus, the electoral consequences of natural disasters likely vary by context (Gasper and Reeves 2011).

While the exact reasons for the rate of decay we find remain beyond the scope of this paper, we acknowledge that apart from the degree of human forgetfulness many political factors
potentially moderate this phenomenon. Elite behavior and the incumbent government’s success in persuasively communicating the beneficial consequences of their policy response via the media play a role (Eisensee and Stroemberg 2007; Besley and Burgess 2002). Voters in affected regions could have learned more about the reasons behind the government’s policies or found out about adverse side effects. The durability of the electoral rewards for policy benefits may also depend on whether those politicians responsible for past government transfers are no longer in power. Future research may start to analyze how these and other factors moderate the longevity of electoral rewards for government transfers and policy benefits more generally.

With respect to the implications for democratic accountability in the case of natural disasters our findings may be interpreted as either good or bad news. On the one hand, voter gratitude for massive relief policies may last longer than myopic retrospection would lead us to expect. Thus, voters seem to have the potential to remember and reward policy choices that governments made several years ago. On the other hand, this implies that the incentives for policymakers to engage in inefficient disaster relief as opposed to preparedness spending are even higher than previous research (Healy and Malhotra 2009; Chen 2010) suggests, because these studies do not take into account the potential long-term electoral rewards to relief spending.

More generally our results highlight that even under favorable circumstances, policymakers and parties should not expect to earn much credit among voters for policies that date back more than a few years. Even though electoral rewards can last longer than theory and past scholarship suggests, they may still decay too quickly given the decades of constant and far less visible policy efforts required to address challenges like climate change, global poverty, or international financial instability. Against this background, one might even consider our results to tell a cautionary tale. Electoral accountability alone appears ill-suited to properly incentivize policymakers to seek appropriate long-term policy solutions to fundamental long-term economic, financial, and environmental problems. This provides an additional rationale to recent attempts that develop complementary accountability mechanisms (Gersbach and Liessem 2008; Mueller 2007) intended to alleviate some of the deficiencies arising from what some have termed the worst form of government except all the others that have been tried.
REFERENCES


### Table 1: Short and Long Term Effects on SPD PR Vote Shares

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<th>Dependent Variable</th>
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<th>98-09</th>
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<td>(3)</td>
<td>(4)</td>
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<td>(1.36)</td>
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<td>(3.57)</td>
<td>(1.58)</td>
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**Note:** Regression coefficients shown with robust standard errors in parenthesis (standard errors for the fixed effects models are clustered by district). Each regression is based on district level data from two election periods (1994 & 1998 for model 1; 1998 & 2002 for models 2-4; 1998 & 2005 for models 5-7; 1998 & 2009 for models 8-10). Models 1-3, 5-6, and 8-9 are fixed effects regressions where the dependent variable is the district level SPD PR vote share. Models 4, 7, and 10 are first differences regressions where the dependent variable is the change in SPD PR vote share between elections and all covariates (except the Flooded indicator and the lagged vote share level) are also first-differenced. Flooded is coded one for districts that were directly affected by the 2002 Elbe flood and zero otherwise. All variables are adjusted for redistricting. Employment Shares are omitted for models 8 and 9 since this data is unavailable for this period.
Figures

Figure 1: Affected versus Unaffected Electoral Districts in the 2002 Election

Note: The map shows the boundaries of the 299 electoral districts in the 2002 German federal election. Directly flood affected districts (i.e., Flooded = 1) are shaded dark gray, unaffected districts are shaded light gray. A district was coded as affected if it experienced at least one of the following events: stabilization or breach of levees, flood warning, over-topping of levee, flooding, evacuation warning, or evacuation. Source: Own computation based on flood report by the International Commission for the Protection of the Elbe River (2002).
Figure 2: SPD and CDU/CSU Popularity in Flooded Regions versus the Rest of Germany

Note: Percent of voters that intend to vote for the SPD (left panel) and CDU/CSU (right panel) with .90 confidence envelopes. Based on Forsa polling data (average monthly N=8,753 (min N=6,044, max N=9,889) available at GESIS – Leibniz Institute for the Social Sciences (dataset identification code: ZA3909).
Figure 3: Trends for SPD PR Vote Share in Affected versus Unaffected Districts

Figure 4: Relative Importance of Issues: Elbe Flood versus Iraq (East Germany)

Note: Percent of voters that mention the Elbe flood and/or the Iraq war among the three most important problems. The upper panel employs a narrow and the lower panel a broader definition of both issues. Flood narrowly defined includes all answers that fall into the following categories: flood, damages from flood, how to finance flood damages. Flood broadly defined includes: narrow definition plus climate and natural disasters, environmental policy. Iraq narrowly defined includes: discussion about war on Iraq, US operations against terror, Iraq war. Iraq broadly defined includes: narrow definition plus foreign policy, war and conflict in general, wars in the world in general. Results are based on Forsa polling data (average monthly N=8,753 (min N=6,044, max N=9,889) available at GESIS – Leibniz Institute for the Social Sciences (dataset identification code: ZA3909).
Figure 5: Change in SPD PR Vote Share 2002-1998 and Distance to Elbe

Note: The changes in SPD PR vote share from the 1998 to 2002 election are modeled with a General Additive Model (GAM) that includes the full set of covariates and a (back-fitted) smoothing spline for the distance to the Elbe River or Flooded Tributary. The left figure plots the partial deviance residuals from the GAM fit against the distance to the Elbe with the main-effect function superimposed (and twice standard error confidence envelopes). Directly flood affected districts (Flooded=1) are highlighted in black. The right figure shows the same plot with superimposed local linear regressions lines that visualize the conditional relationship between SPD vote gains and the distance to the Elbe within each of the Land regions that have at least one directly affected district.
Figure 6: Mobilization: Flooded Regions versus the Rest of Germany

Note: Percent of eligible voters that intend to turn out with .90 confidence envelopes. Based on Forsa polling data (average monthly N=8,753 (min N=6,044, max N=9,889) available at GESIS – Leibniz Institute for the Social Sciences (dataset identification code: ZA3909).
Figure 7: Persuasion: Flooded Regions versus the Rest of Germany

Note: Left panel shows percent of respondents that intend to vote for SPD among voters that voted for the SPD in the 1998 election. Right panel shows percent of respondents that intend to vote for SPD among voters that voted for the CDU/CSU in the 1998 election. Based on Forsa polling data (average monthly N=8,753 (min N=6,044, max N=9,889) available at GESIS – Leibniz Institute for the Social Sciences (dataset identification code: ZA3909).
**Appendix**

*A. List of Directly Affected Electoral Districts*

The table below displays the list of electoral districts included in our *Flooded* measure.

<table>
<thead>
<tr>
<th>District Name</th>
<th>District ID</th>
<th>State</th>
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</thead>
<tbody>
<tr>
<td>Elbe-Elster - Oberspreewald-Lausitz II</td>
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<td>Schwerin - Ludwigslust</td>
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<td>Mecklenburg-Vorpommern</td>
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<td>Lüchow-Dannenberg - Lüneburg</td>
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<td>Sachsen-Anhalt</td>
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<td>Bernburg - Bitterfeld - Saalkreis</td>
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<td>Sachsen-Anhalt</td>
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<td>Halle</td>
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<td>Sachsen-Anhalt</td>
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<td>Herzogtum Lauenburg - Stormarn-Süd</td>
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<td>Schleswig-Holstein</td>
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<td>Gera - Saale-Holzland-Kreis</td>
<td>196</td>
<td>Thüringen</td>
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<td>Greiz - Altenburger Land</td>
<td>197</td>
<td>Thüringen</td>
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B. Variables Description

The list below provides definitions and sources for the covariates that are included in the regressions.

- **Population Density**: Inhabitants per square kilometer. Source: Bundeswahlleiter Strukturdaten (selected years).
- **Share of Foreigners**: Share of registered foreigners in total population. Source: Bundeswahlleiter Strukturdaten (selected years).
- **Population Outflow**: Annual number of out-migrants per 1000 inhabitants. Source: Bundeswahlleiter Strukturdaten (selected years).
- **Share of Elderly**: Share of population aged 60 years in total population. Source: Bundeswahlleiter Strukturdaten (selected years).
- **Unemployment Rate**: Official unemployment rate. Bundeswahlleiter Strukturdaten (selected years).
- **Employment Share: Agriculture**: Share of registered employees in the agricultural sector in total number of registered employees. Bundeswahlleiter Strukturdaten (selected years).
- **Employment Share: Manufacturing**: Share of registered employees in the manufacturing sector in total number of registered employees. Bundeswahlleiter Strukturdaten (selected years).
- **Employment Share: Trade Services**: Share of registered employees in the trade service and traffic sector in total number of registered employees. Bundeswahlleiter Strukturdaten (selected years).
- **Employment Share: Other Services**: Share of registered employees in other services sector in total number of registered employees. Bundeswahlleiter Strukturdaten (selected years).
- **SPD Incumbent in Land**: Coded 1 if SPD is majority party in Land Parliament and 0 otherwise. Source: GESIS – Leibniz Institute for the Social Sciences, DVD “Landtagswahlen 1960-2004” (V2.0), www.election.de/ltw.html
- **Distance to Elbe or Flooded Tributary**: Shortest as-the-crow-flies distance from district centroid to Elbe river or major flooded tributary as shown on map in kilometers. Authors’ GIS computation.