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Keywords: Voter rationality, Responsive shock, Non-Responsive Shock, Election Outcomes.

JEL Classification: P16, D72, H12

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Exogenous Shocks and Electoral Outcomes: Re-examining the Rational Voter Hypothesis[*]

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Abstract

Voters are assumed to be irrational if they respond to shocks beyond the control of politicians. What if the politicians can respond to such shocks? Using a theoretical model, where shocks can either be responsive (allowing politicians to respond) or non-responsive, we show that voters are irrational if non-responsive shocks affect electoral outcomes. We test this using data from the 1991 Indian parliamentary elections. In the middle of the election, the leader of the opposition was assassinated. We find that this affected the electoral outcomes indicating irrationality on the part of Indian voters.

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1   Introduction

An integral feature of any democracy is elections whereby citizens elect candidates of their choice to represent them. Such choices reflect the opinions and beliefs that people harbour about the contesting candidates. If voters are rational, voting decisions will be based on the information voters have about the ability of potential candidates [Downs, 1957; Campbell et al., 1969].[1] Any exogenous shock, which is beyond the control of the politician and one which candidates and/or political parties cannot respond to, should not affect voting behaviour.[2] If they do, it is viewed as irrational behaviour on the part of the voters.

There is now a large (and growing) literaure using data from both developed and developing countries that tries to identify voter rationality by investigating how they respond to exogenous events that are out of the control of politicians. Examples of such events include both natural disasters [Eriksson, 2016; Celeste Lay, 2009; Healy and Malhotra, 2009; Gasper and Reeves, 2011; Chen, 2013; Cole et al., 2012; Akarca and Tansel, 2016; Gallego, 2018; Klomp, 2020; Masiero and Santarossa, 2021] and (external) economic shocks [Ebeid and Rodden, 2006; Leigh, 2009; Wolfers, 2002; Kayser and Peress, 2012]. However, while these events are exogenous, the impact of such events, including that on voting behaviour, depends on how the incumbent politicians respond: these shocks provide politicians the opportunity to demonstrate their leadership skills, through their response. A rational voter should ideally take such information into account and update his/her belief about the ability of the politician. Consequently, a part of voter response to such shocks would therefore be consistent with them being rational [Ashworth et al., 2018].

Therefore, to accurately identify irrationality in voting behaviour, it is necessary to consider exogenous events (or shocks) that do not create further opportunities for voters to learn more about the abilities of their leaders. Our paper is an attempt to investigate such irrationality in the light of an event following which the electorate cannot update their beliefs about the ability of the candidates. We do this by examining the electoral effects of the assassination of a senior politician and a party leader in the middle of the 1991 National Parliamentary elections in India. The environment is unique because this is an exogenous shock and the contestants were unable to respond to the shock thereby providing any additional information to the voters about their ability.

What does the response of voters tell us about voter rationality? To investigate this question, we first develop a simple theoretical framework where a shock can be a *responsive* shock or a *non-responsive* shock. Examples of *responsive* shocks include natural disasters

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[1]There is a fairly large volume of theoretical literature [Banks and Sundaram, 1993; Besley and Burgess, 2002] that assumes voter rationality to explain political phenomenon such as the government's response to voter preferences.

[2]The idea is aptly summarized by Achen and Bartels [2004, page 8] *to the extent that voters engage in sophisticated attributions of responsibility they should be entirely unresponsive to natural disasters, at least on average.*

(a flood, an earthquake, a drought or a volcanic eruption) or economic shocks (an oil price shock). Politicians can respond to a *responsive* shock, thereby allowing voters to update their beliefs about the ability of the incumbent. On the other hand, a *non-responsive* shock is one to which politicians are unable to respond to and therefore, the voter does not gain any new or additional information about the incumbent as a result of the shock. Such shocks can, however, influence how voters feel about a politician or political party, irrespective of their governing abilities. This can be perceived to be a form of *sympathy* that voters feel towards a candidate or a party. If a shock does not have a *responsive* characteristic, and voters have no irrational traits, then the electoral fortunes of the contesting parties should be unaffected by the shock. If, however, we find that electoral outcomes are affected by such a *non-responsive* shock, we hypothesize that voters exhibit irrational behaviour.

The 1991 Parliamentary elections in India provides us with an excellent opportunity to test our hypotheses relating to voter rationality. India is perhaps the only democracy where elections take place in phases. The assignment of constituencies to phases is quasi-random. The exercise is undertaken by the independent Election Commission of India (ECI) [see Gilmartin, 2009; Khalil et al., 2019]. Political parties and candidates do not have any influence on this assignment. The results are announced after *all* polling is complete. Rajiv Gandhi, the leader of the main opposition party (Congress-I or INC), was assassinated in the middle of the 1991 election (in between phases). The ECI postponed the polling of the remaining phases. No other changes were allowed. The assassination was a *non-responsive* shock as the rules of the Indian election system and the election code of conduct, ensured that the contesting candidates could not "react" to this shock (by announcing new policies, changing their election manifesto, adding new candidates or choosing when polling can be re-organized). This assassination shock, therefore, should not have had any effect on voters' beliefs about the ability of the contesting candidates and parties.[3] We estimate the effect of the assassination on electoral outcomes (particularly the electoral fortunes of Rajiv Gandhi's party, the INC) using a difference-in-difference framework. If, we find that electoral outcomes are affected by such a shock, our theoretical hypotheses are confirmed, i.e., voters exhibit irrational behaviour.

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[3] Is it feasible that the assassination did provide additional information to the voters about the (governing) ability of the party? For example, suppose that the voters did not have high perception about the governing abilities of a Rajiv Gandhi led government (this includes the failed and unpopular peace keeping mission in Sri Lanka, ever-growing terrorism crisis in Punjab, the Bofors scandal, the Shah Bano case that angered Hindus and progressive Muslims and the consequent over correction with Ayodhya). The assassination could mean that any INC government without Rajiv Gandhi would be a better at governing, thus providing additional information to the voter about the ability of the party. This is unlikely to be the case, as INC did not name the party leader to replace Rajiv Gandhi until after the election results had been announced. Hence, in the post-assassination phase, the voters actually faced greater uncertainly about the potential governing ability of INC and therefore it is highly unlikely that that the assassination provided any new information about the ability of INC. The incumbent Prime Minister was Chandra Sekhar. He headed a minority government and was not a candidate to lead the government, post 1991 elections. So it is unlikely that the assassination provided any meaningful additional information about to the voters about the other parties as well.

Our results show that the INC gained significantly from this event through increased vote shares and improved likelihood of victory. This is despite opinion polls conducted prior to Rajiv Gandhi's assassination predicting that INC would lose the elections. The dramatic change in outcomes, particularly since parties and candidates were unable to respond in any other way, suggests that sympathy played a crucial role in determining the final outcomes of the election. Our results are indicative of irrational behaviour on the part of Indian voters.

In addition to contributing to our understanding of whether or not voters are rational, our paper also contributes to the literature on the role of emotions in influencing electoral outcomes. In our case, of particular interest is sympathy.[4] Jasperson [2006] argues that cases of political tragedy evoking sympathy motivate broader questions of the impact of emotions on electoral outcomes. There have been instances through history (both in developed and developing countries) of unexpected events or deaths leading to increased political support, primarily driven by the sympathy factor. Examples include the Pakistan People's Party's (PPP) victory in the 2008 general elections in the country after the assassination of Benazir Bhutto (the leader of the party) in December 2007, which was viewed as a result of sympathy vote. In Brazil, when Eduardo Campos, the Socialist Party politician and third-place candidate in Brazil's presidential race, died in a plane crash, his vice-presidential running mate, Marina Silva, who officially ascended to the top of the party ticket benefitted from a surge in popular support.[5] In the 2002 Minnesota senate race, the incumbent Senator Paul Wellstone died in a plane crash 12 days before the election. It was expected that the consequent sympathy vote would propel Wellstone's replacement, former Vice President Walter Mondale, to victory in the election. Indeed Walter Mondale experienced a bump in support. The assassination attempts (by LTTE) in two successive presidential elections (1994 and 1999) in Sri Lanka were designed to evoke feelings of anger and sympathy among the voters [de Silva, 2000]. In 1994, the opposition UNP candidate (Gamini Dissanayake) was killed; in 1999 the incumbent president (Chandrika Kumaratunge) was targeted but escaped assassination. However, it is not clear whether and how sympathy *actually* affected electoral outcomes in any of these cases. The bump in popularity that the parties and candidates experienced in the immediate aftermath of the event disappeared by the time citizens voted.[6] The only exception is the assassination attempt on Chandrika

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[4]There is now a growing literature on how personal emotional reactions to events completely unrelated to public affairs influence voting decisions: specifically assessing the electoral impact of local football games, events that government has nothing to do with and for which no government response would be expected [see, for example Healy et al., 2009, 2010; Miller, 2013; Lee Jr. et al., 2017].

[5]See the Atlantic.

[6]In the case of Pakistan, opinion polls from November 2007, i.e., before the assassination, predicted that PPP would win by approximately 30% of the votes. While sympathy bumped up PPP's popularity during the campaign phase, ultimately PPP's wining margin was approximately on par with opinion polls conducted prior to Bhutto's assassination. In Brazil Silva won 21% of the vote in the first round of the elections in October (less than what the opinion polls had predicted), coming 3rd, and failing to advance to the run-off, indicating that sympathy regarding the death of Campos did not sway the voters. In Minnesota, the surge in sympathy for Walter Mondale disappeared by election day, and his challenger Norm Coleman won the race. In Sri Lanka, the assassination of Gamini Dissanayake in 1994 failed to generate sympathy for his party. His widow, who took over the role of the party leader was viewed as a political neophyte.

Kumaratunge, the incumbent president of Sri Lanka, prior to the presidential election in 1999. The assassination attempt on her life resulted in a sympathy wave for Kumaratunge and she easily won an election that she was not expected to win.

Our paper is also related to the growing literature on the electoral impact of terrorist attacks. The identification in much of this recent literature follows Brodeur [2018], who argues that conditional on the location and timing of terror events and controlling for the type/weapon of the attack, the success or failure of the terror attack is random.[7] Our strategy is different. It takes into account the fact that the timing of the event was random: there was no particular reason for the attack to happen on this specific day. We utilize the random nature of assassination and the quasi-random assignment of seats to phases to estimate the causal impacts of the assassination.[8] The paper that is closest to our approach is Montalvo [2011], who examines whether the Madrid terrorist attack on 11th March, 2004 causally affected electoral outcomes.[9] Given that the attack happened only three days prior to the election, he is able to divide the voters into two groups: one group knew about the terrorist attacks before they voted (the domestic voters) and another group of voters did not know about them (Spanish nationals abroad), who could vote several days prior to the actual date of the election. Montalvo [2011] then uses a difference-in-difference approach to estimate the causal effect of the terrorist attack. To address the possible criticism that Spanish residents abroad are not necessarily a random subset of all Spanish voters, he relies on the assumption of parallel trends to justify the use of the DID approach. This problem does not arise in our case as voters who voted prior to the assassination are a random subset of all voters as the assignment of seats to phases was quasi-random.

The rest of the paper is organized as follows. In Section 2, we describe a theoretical framework of voter rationality. This provides us with two testable hypotheses. Section 3 describes how we adapt our theoretical model to the 1991 parliamentary election of India. Section 4 describes the data, empirical specification and the descriptive statistics. Our empirical results are presented in Section 5 and finally Section 6 concludes.

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[7]This identification mechanism is now used extensively in the literature that examines the effect of terrorism on a range of economic and political outcomes [see, for example Baccini et al., 2021; Yousaf, 2021; Amarasinghe, 2021].

[8]This is similar to the argument of Jones and Olken [2005], who restrict their analysis of whether leaders to cases where a leader's rule ended at death due to either natural causes or an accident. They argue that In these cases, the timing of the transfer of power from one leader to the next is randomly determined by the death of the leader.

[9]See also Bali [2007]; Montalvo [2011, 2012]

2   Voter Rationality: Theoretical Framework

We consider a setting with one Voter and two Politicians (who are representatives of the two political parties): an *Incumbent* (I) and a *Challenger* (C). Politicians can either be of high ability $\bar{\theta}$ or low ability $\underline{\theta}$, with $\bar{\theta} > \underline{\theta} > 0$, but ability is not perfectly observable by the voter. We assume that there are two governing periods. At the beginning of the first period, I is elected to form the government. Consequently, I can provide a certain level of governance, which is captured in our model by the level of public good provision. At the end of the first period, both I and C have to face an election.

At the beginning of the first governing period, the voter has certain beliefs about the ability of I and C. Let π_i ($i = I, C$) be the probability with which the voter believes that politician i is of high ability. At the end of the first period, after observing the level of governance provided by I, the voter updates his belief about I's ability. We assume that the voter's belief about C's ability remains unchanged at π_C.[10]

During the first governing period, voters and the politicians face an unobservable idiosyncratic shock and an observable exogenous shock. The exogenous shock can be *responsive* or *non-responsive*. A *responsive shock* adversely affects the level of governance provided by I, captured by a decrease in the level of public good provision. However, such a shock would also provide an opportunity to I to *act* in response to the shock, which consequently leads to an increase in public good provision. An exogenous shock such as a flood is an example. While a flood reduces the amount of public good available, it could, at the same time, provide an opportunity to the incumbent to undertake flood relief measures. A *non-responsive* shock, on the other hand, does not affect the level of governance (does not lead to any decrease in the level of public good provision) and in addition, it also does not provide an opportunity for I to undertake any action in response to this shock.

Responsive Shocks and the Level of Governance: The level of governance provided by I in period 1 depends on three factors: I's ability, an idiosyncratic unobservable shock distributed as standard normal $N(0,1)$, and a responsive shock (I_d). Specifically, the level of governance provided by I can be written as:

$$g_1 = \theta_I(1 + kI_d\gamma) - I_d\omega_1 + \epsilon_1 \tag{1}$$

where θ_I denotes the I's ability, which is not observed by the voter and ϵ_1 captures the unobservable idiosyncratic shock with $\epsilon_1 \sim N(0,1)$. The responsive shock reduces the level of public good provision by ω_1, and this decrease is perfectly observable by the voter. However, since I_d is a responsive shock, I can undertake action γ in response to the shock. Though such action is perfectly observable by the voter, the actual amount of increase in

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[10]It is assumed that the challenger cannot undertake any action that would enable the voter to update his beliefs about the challenger.

public good provision as a result of such an action depends on I's ability. This increase is given by $\theta_I k\gamma$, where $k \in (0,1)$ is a parameter, which captures the ease with I's action (γ) can lead to more public good provision. For a given γ and θ_I, the higher is k, the greater is effect of the incumbent's reaction to I_d.

The voter can observe the aggregate level of governance i.e. the amount of public good provision g_1 by differentiating between the two parts: the one dependent on the type of I and unobservable shock ($\theta_I(1 + kI_d\gamma) + \epsilon_1$) and the other part which captures the fall in public good provision as a result of the responsive shock ($-I_d\omega_1$).

Non-Responsive Shocks and Sympathy: By definition, politicians cannot respond to *non-responsive* shocks. But such shocks can evoke emotions and we assume that such emotions take the form of sympathy. This sympathy is independent of the governing ability of the politicians. We define an indicator variable I_s, which takes the value 1 if the voters face a *non-responsive* shock. Such a shock affects voters' sympathy ($s_i \in [0,1]$) for politician i ($i \in \{I, C\}$) as follows:

$$s_i = \bar{s}_i + I_s\psi_i \tag{2}$$

$\bar{s}_i \in [0,1)$ is defined as the baseline sympathy associated with politician i while $\psi_i \in (0, 1 - \bar{s}_i)$ captures the strength of the effect of the shock on sympathy. The higher is ψ_i, the greater is the effect of I_s on s_i.

Voters' Decision: The voter's decision after the end of period 1 depends on his *perception* about each of the politicians. We define such *perception* of the voter for politician $i = I, C$ as a weighted average of the belief about i's ability and sympathy for a politician i. Recalling that π_i ($i \in \{I, C\}$) is the probability with which the voter believes that politician i ($i \in \{I, C\}$) is of high ability, *perception* is given by

$$\kappa_i = \rho\pi_i + (1 - \rho)s_i \tag{3}$$

$\rho \in (0,1)$ is the degree of rationality of the voter. From equation (3), we can see that $\kappa_i \in (0,1)$. The higher is ρ, the more rational is the voter and if $\rho < 1$, we say that the voter exhibits irrational behaviour.

The level of governance provided by a politician depends solely on his ability (as captured by equation (1)) and is not affected by the sympathy associated with him. Hence, a more rational voter puts a higher weight on his belief about the politician's ability.

Updating beliefs about I's ability after period 1:   At the end of the first period, after observing the level of g_1 provided by I, the voter updates his belief π_I about the

likelihood of I being high ability. Recall from equation (1) $\epsilon_1 = g_1 + I_d\omega_1 - \theta_I(1 + kI_d\gamma)$. Using Bayes' rule, the updated belief π_I^u about I's ability can be written as

$$\pi_I^u = \frac{\pi_I\phi(g_1 + I_d\omega_1 - \bar{\theta}(1 + kI_d\gamma))}{\pi_I\phi(g_1 + I_d\omega_1 - \bar{\theta}(1 + kI_d\gamma)) + (1 - \pi_I)\phi(g_1 + I_d\omega_1 - \underline{\theta}(1 + kI_d\gamma))} \tag{4}$$

where ϕ is the pdf of the standard normal distribution. Following this updation of the belief, the voters' perception about I's ability is given by:

$$\kappa_I^u = \rho\pi_I^u + (1 - \rho)s_I \tag{5}$$

Re-election of the incumbent: Since the voter's decision is based on his perception about the politicians, and in our model $\kappa_i \in (0, 1)$, we can think of κ_i as a measure of the vote share of the politician i. Thus, the incumbent is re-elected if $\kappa_I > \kappa_C$. Using equations (2) and (3), we can show that re-election of I requires

$$\rho\pi_I^u > \rho\pi_C + (1 - \rho)\{(\bar{s}_c - \bar{s}_I) + I_s(\psi_C - \psi_I)\} = \bar{\kappa}$$
$$\implies \pi_I^u > \frac{\bar{\kappa}}{\rho} \tag{6}$$

Using the expression of π_I^u from equation (4), we can re-write equation (6) as:

$$\frac{\phi(g_1 + I_d\omega_1 - \bar{\theta}(1 + kI_d\gamma))}{\phi(g_1 + I_d\omega_1 - \underline{\theta}(1 + kI_d\gamma))} \geq \frac{\frac{\bar{\kappa}}{r}}{1 - \frac{\bar{\kappa}}{r}}\frac{(1 - \pi_I)}{\pi_I}$$

Substituting the expression for the pdf of the standard normal distribution, we get

$$\frac{e^{-\frac{1}{2}\{(g_1 + I_d\omega_1) - \bar{\theta}(1 + kI_d\gamma)\}^2}}{e^{-\frac{1}{2}\{(g_1 + I_d\omega_1) - \underline{\theta}(1 + kI_d\gamma)\}^2}} \geq \frac{\frac{\bar{\kappa}}{\rho}}{1 - \frac{\bar{\kappa}}{\rho}}\frac{(1 - \pi_I)}{\pi_I} \tag{7}$$

Taking logarithm on both sides we can obtain the threshold value of g_1 ($\hat{g}_1$), such that if the observed level of governance is higher than this threshold, then the incumbent is re-elected. This threshold is given by

$$\hat{g}_1(\omega_1, \gamma) = \frac{\log\frac{\frac{\bar{\kappa}}{\rho}}{1 - \frac{\bar{\kappa}}{\rho}}\frac{(1 - \pi_I)}{\pi_I}}{(\bar{\theta} - \underline{\theta})(1 + kI_d\gamma)} + \frac{(\bar{\theta} + \underline{\theta})}{2}[1 + kI_d\gamma] - I_d\omega_1 \tag{8}$$

From the expression of $\hat{g}_1$ in equation (8), we can derive the probability of the incumbent winning the election as

$$\Pr(g_1 \geq \hat{g}_1(\omega_1)) = \Pr[\{\theta_I - \frac{(\bar{\theta} + \underline{\theta})}{2}\}(1 + kI_d\gamma) + \epsilon_1 > \log\frac{\frac{\bar{\kappa}}{\rho}}{1 - \frac{\bar{\kappa}}{\rho}}\frac{(1 - \pi_I)}{\pi_I}] \tag{9}$$

The empirical literature has typically investigated the question of voter rationality by considering the effect of a *responsive shock* (for example, natural disasters). They have hypothesised that such shocks will not affect rational voting behaviour. Building on this, we

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show that this is true only under certain conditions. In other words, it is possible that a *responsive shock* can affect voting behaviour even if the voter is rational.

From equation (7), we observe that I's probability of re-election is affected via two channels. First, the probability of re-election can be affected through a change in the voters' belief, which is captured by the left hand side of equation (7). We denote such a change as a *rational* change. Second, the probability of re-election depends on the value of $\bar{\kappa}$ (right hand side of equation (7)). Since π_C is constant and ψ_I and ψ_C are parameters, for a given level of rationality ρ, $\bar{\kappa}$ can change only due to change in sympathy levels (s_I or s_C) because of a non-responsive shock I_s. Hence, any change in the probability of re-election of I due to a change in $\bar{\kappa}$ (induced by sympathy) is called an *irrational* change.

Let us consider each of the two channels in order. Assume that $I_s = 0$. First consider the case where $I_d = 0$. This implies $g_1 = \theta_I + \epsilon_1$ and so the condition for I's re-election (equation (7)) can be re-written as:

$$\frac{e^{-\frac{1}{2}\{g_1 - \bar{\theta}\}^2}}{e^{-\frac{1}{2}\{g_1 - \underline{\theta}\}^2}} \geq \frac{\frac{\bar{\kappa}}{\rho}}{1 - \frac{\bar{\kappa}}{\rho}} \frac{(1 - \pi_I)}{\pi_I}$$

Now suppose we have $I_d = 1$, but $k = 0$. In this case the new level of public good provided can be written as $g_1' = g_1 - \omega_1$. Substituting this in equation (7) we can observe that the winning condition remains the same as in the case when $I_d = 0$. Further, since we are in the regime of no non-responsive shock i.e. $I_s = 0$, $\bar{\kappa}$ is unchanged, and hence the right hand side of equation (7) remains unchanged, irrespective of whether a responsive shock strikes or not. Hence, if the voter is rational, and a politician's action does not result in a change in public good provision, then we can conclude that a shock with responsive characteristic does not have any effect on voting behaviour.

Now suppose $k > 0$ i.e., a politician's action in response to a responsive shock, leads to an increase in public good provision. Consequently, when $I_d = 1$ and if g_1' is now the observable level of public good, equation (7) can be re-written as

$$\frac{e^{-\frac{1}{2}\{(g_1' + I_d\omega_1) - \bar{\theta}(1 + kI_d a)\}^2}}{e^{-\frac{1}{2}\{(g_1' + I_d\omega_1) - \underline{\theta}(1 + kI_d a)\}^2}} \geq \frac{\frac{\bar{\kappa}}{\rho}}{1 - \frac{\bar{\kappa}}{\rho}} \frac{(1 - \pi_I)}{\pi_I} \tag{10}$$

Observe that the above condition is different from the one we get when $I_d = 0$. Hence, we can conclude that a responsive shock can also affect rational voting behaviour if $k > 0$. This is summarised in the following lemma.

Lemma 1 *Consider a responsive shock ($I_d = 1$ and $I_s = 0$). This shock can affect I's probability of re-election if $k > 0$. The probability of re-election remains unaffected only if $k = 0$.*

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The intuition follows from the fact that in a situation where a politician's action in response to a shock does not affect public good provision, the threshold level of public good provision $(\hat{g_1})$ as represented in equation (8) declines exactly by the amount ω_1. Thus, the voter revises his expectation about I downwards exactly by the level of reduction in governance as a result of the shock. As opposed to this, when $k > 0$, $\hat{g_1}$ is not revised downwards exactly by the level of the reduction in public good provision due to the shock. The voter's belief about I is also influenced by I's response.

A responsive shock provides I with an opportunity to respond to the shock, leading to an increase in public good provision $(k > 0)$. The probability of I's re-election increases because it affects the left hand side of equation (7). Hence, the effect of such shocks on electoral outcomes cannot be solely attributed to irrational voting behaviour on behalf of the voter. There is a degree of rationality embedded in the aggregate effect.

Subsequently, we want to focus on changes in electoral outcomes which can solely be explained by irrational voting behaviour. In this respect, we explore the effects of a shock which exhibits only non-responsive characteristic $(I_s = 1$ and $I_d = 0)$. From equation (9), we can conclude that any change in the probability of winning for I which comes through a change in $\bar{\kappa}$ cannot be attributed to the voter updating his belief about I. Further, from equation (9) we find that a shock can affect $\bar{\kappa}$ if and only if it has a non-responsive characteristic $(I_s = 1)$, and $\rho < 1$.

Remark 1 *If a shock with the feature $I_s = 1$ and $I_d = 0$ affects the winning probability, then it indicates $\rho < 1$, and is consistent with irrational voting behaviour.*

The theoretical framework guides our empirical strategy by generating the following testable hypotheses.

Hypothesis 1 *If vote share (κ_i) from equation (3) is positively related to s_i, it would guarantee $\rho < 1$ i.e. any change in the vote shares of politician I as a result of a change in sympathy is consistent with irrational voting behaviour.*

Hypothesis 2 *If the probability of winning, as captured by equation (9) is positively related to s_i, i.e., any change s_i resulting in a change in the probability of I winning, reflects irrational voting behaviour.*

We now test the two hypotheses usng data from the 1991 National Parliamentary election in India.

3 Testing irrational voting behaviour: From Theory to Empirics using the 1991 Parliamentary Elections in India

Hypotheses 1 and 2 imply that to investigate whether voters behave irrationally, we need a shock that is purely non-responsive ($I_s = 1$ and $I_d = 0$). The assassination of Rajiv Gandhi, former Prime Minister and the leader of the main opposition party (INC), in the middle of the 1991 Parliamentary elections in India provides us with an environment to test our hypotheses relating to irrational voting behaviour. This was a pure non-responsive shock as following the realization of the shock, the parties could not undertake any action to manage the situation. The independent ECI managed the aftermath. There was therefore no additional information that the voters could use to update their beliefs about type or ability of the contesting candidates. There was, however, a marked rise in sympathy for INC (in this case the challenger). India Today (June 15, 1991, before the elections were complete and results had been announced) wrote:

> *Rajiv Gandhi has gone. His death now looms large over the election scene. Politics has now shifted from issues to the sympathy factor. It is now the Congress(I)'s Rajiv card versus the BJP's Ram and the National Front's Mandal cards. If the sympathy factor works, the Congress(I) will gain dramatically.*

Similarly on 23rd May, two days after Rajiv Gandhi's assassination, the Los Angeles Times wrote:

> *. . . sympathy vote may bring Gandhi's party the majority he wasn't expected to win.*

Finally, Rudolph [1993] summarizing the 1991 Lok Sabha elections wrote:

> *Rajiv Gandhi . . . won Congress's greatest electoral victory with the help of a sympathy vote.*

3.1 Parliamentary Democracy in India and Background to the 1991 Elections

India has a parliamentary electoral system, consisting of two houses, the Lower House called Lok Sabha, and the Upper House called Rajya Sabha. Parliamentary (or Lok Sabha) elec-

tions are typically held once every five years, and the electoral units are called parliamentary constituencies.[11] Each state is divided into several constituencies in proportion to the size of its electorate, resulting in a total of 543 constituencies, each of which elects its Member of Parliament by plurality voting. Candidates can be nominated by political parties (which could be national or state based) or they could stand as independents. Elections follow the Westminster structure with the candidate winning the most votes declared the winner. The party (or alliance, or coalition) winning more than half the seats forms the Government.

Rajiv Gandhi was the Prime Minister of India and INC was the party in power during the period 1984–1989. While the INC remained in power for the full term, Rajiv Gandhi's tenure as Prime Minister was blotted by a number of scandals and political mis-calculations (see footnote 3). Mr Vishwanath Pratap Singh, an erstwhile senior minister in the INC government resigned from the party and convened the National Front, a broad national coalition with Janata Dal (JD) being the primary constituent. This national opposition coalition united a rather disparate range of opposition parties (including several regional parties). The National Front also received additional "outside" support from the relatively more right wing Bharatiya Janata Party (BJP) and the Communist Party of India (Marxist) led Left front. The National Front defeated INC in the 1989 parliamentary elections. However internal conflicts soon arose within the coalition and ultimately the Parliament was dissolved within 16 months of formation.[12] The National Front officially ceased to exist (and unlike in 1989, there was no seat sharing arrangement between the non INC parties). The country went to the polls in May–June 1991. INC was the opposition and the primary challenger, and Rajiv Gandhi was to be the prime minister, if INC won the majority and formed the government.

Given the size of the Indian electorate, National Parliamentary elections in India are held in different phases and results are announced only after all phases have completed their voting. The independent Election Commission of India (ECI) decides on the assignment of seats to the different phases. In particular, the political parties have no role to play in this process. The election schedule is drawn up in a way that allows the security forces to move from one area to another in time, lengthening the total duration of the election. The assignment of seats (constituencies) to the different phases varies across elections, is quasi-random, and is orthogonal to prior election outcomes. Figure A1 presents the distribution of seats in the 1989, 1991 and 1996 National Parliamentary elections by phase of polls. There is clearly considerable variation in phase assignments across elections and different parts of the country go to polls in different phases across elections. This is important for the identification strategy that we utilize in this paper.[13]

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[11]Of course the parliament can be dissolved before the end of its 5-year term if the government collapses because of withdrawal of support from some key members of the ruling coalition of parties. This happed after the 1977, 1989, 1996 and 1998 National Parliamentary elections.

[12]During its brief tenure, the country had been plunged into turmoil by the split between the BJP and JD over Backward Castes' rights and the clamor for *Hindutva* (or militant Hinduism).

[13]While prior to the 1991 elections, elections were held in multiple phases over a week. The 1991 national elections was the first time the phased nature of scheduling elections was formalized [Gilmartin, 2009].

Figure 1: Assignment of Seats to Phases: National Parliamentary Elections, 1989 and 1991
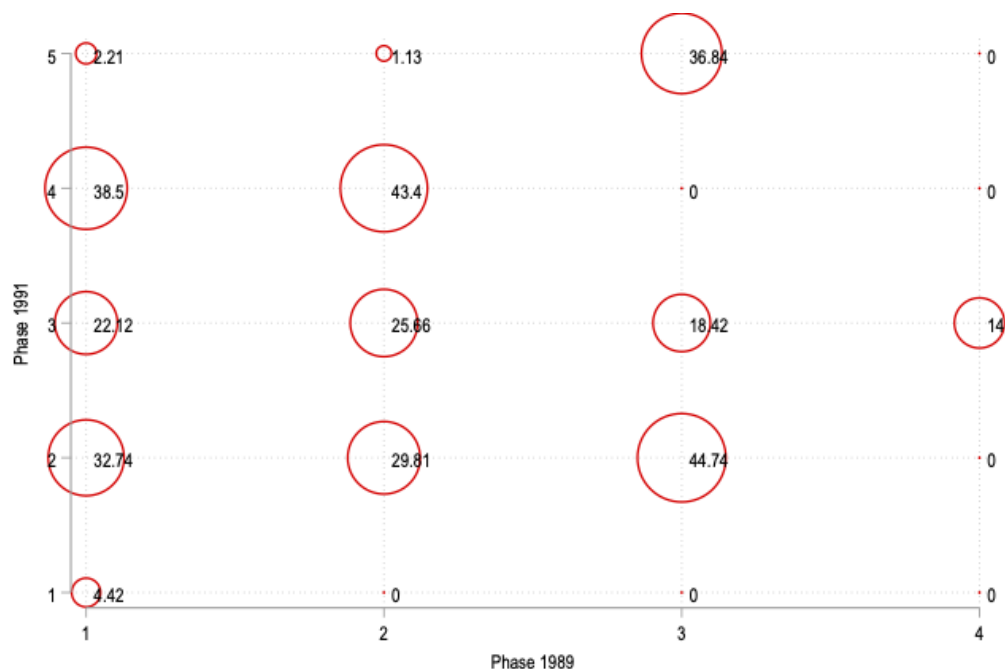
Notes: The size of the bubbles are proportional to the corresponding proportions in each cell. Election dates in 1989: November 22 (Phase 1), November 24 (Phase 2), November 26 (Phase 3). Election dates in 1991: May 10 (Phase 1), May 20 (Phase 2), June 12 (Phase 3), June 15 (Phase 4). Phase 4 in 1989 denotes constituencies where elections were not held and Phase 5 in 1991 denotes constituencies where elections were not held.

Figure 1 presents the transition matrix of phase assignment across the 1989 and 1991 parliamentary elections.[14] To see the quasi-random assignment, note that of the 226 constituencies that had been assigned to Phase 1 in 1989, 4.42 % were assigned to Phase 1 in 1991, 32.74% in Phase 2, 22.12% in Phase 3, 38.50% in Phase 4 and 2.21% did not poll in 1991. We see similar variation in phase assignment for seats assigned to Phases 2 and 3 in 1989.

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[14]The 1989 parliamentary elections were held in three phases: November 22 (Phase 1), November 24 (Phase 2) and November 26 (Phase 3). In both elections, polling was not conducted in a number of constituencies mainly because of political violence.

The 1991 National Parliamentary Elections

The 1991 parliamentary elections was scheduled to be held in four phases across the country: 10th May, 20th May, 23rd May and 26th May. However, on the 21st of May, after polling had been completed in the first two phases, Rajiv Gandhi, was assassinated during one of his campaign rallies. As a consequence, the originally scheduled 3rd and 4th phases were postponed to 12th June and 15th June respectively. Importantly, *nothing else could change*. Figure 2 summarizes the timing of the different events in the 1991 election. The two phases where the polls were held prior to Rajiv Gandhi's assassination are termed the *pre-assassination* phase and the last two phases scheduled for after the assassination are termed the *post-assassination* phase. Figure 3 presents the heat map of the pre- and post-assassination constituencies in the 1991 elections.[15]

Figure 2: Timing of Elections and Assassination
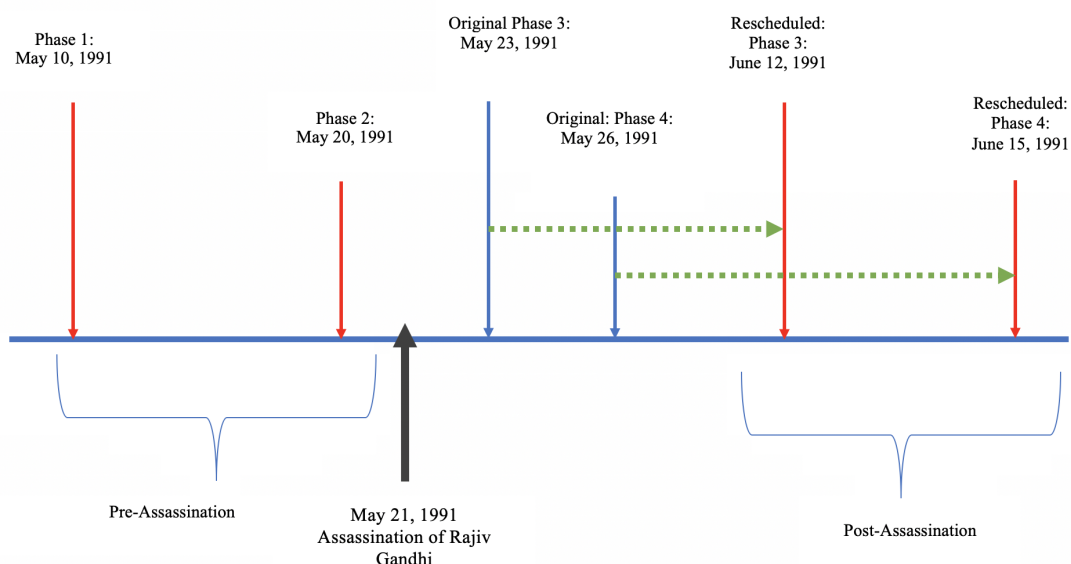
The assassination was an unexpected (or random) event. There was no particular reason for the attack to happen on this specific day. This random nature of assassination and the quasi-random assignment of seats to phases implies that the estimated impacts of the assassination could be interpreted as causal. Our aim is to examine whether there was any significant effect of this shock on the electoral performance of the three major parties: INC, JD and BJP.[16] If this particular shock i.e., the assassination had a positive effect on

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[15]Due to political disturbances, elections were not held in the states of Jammu and Kashmir and Punjab.

[16]INC was the main opposition party and the challenger. The incumbent prime minister was Chandra Sekhar, who headed a minority government of a breakaway faction of JD and neither he nor his party were in the race to form a government.

Figure 3: Pre- and Post-Assassination Phase of Polls. National Parliamentary Elections 1991
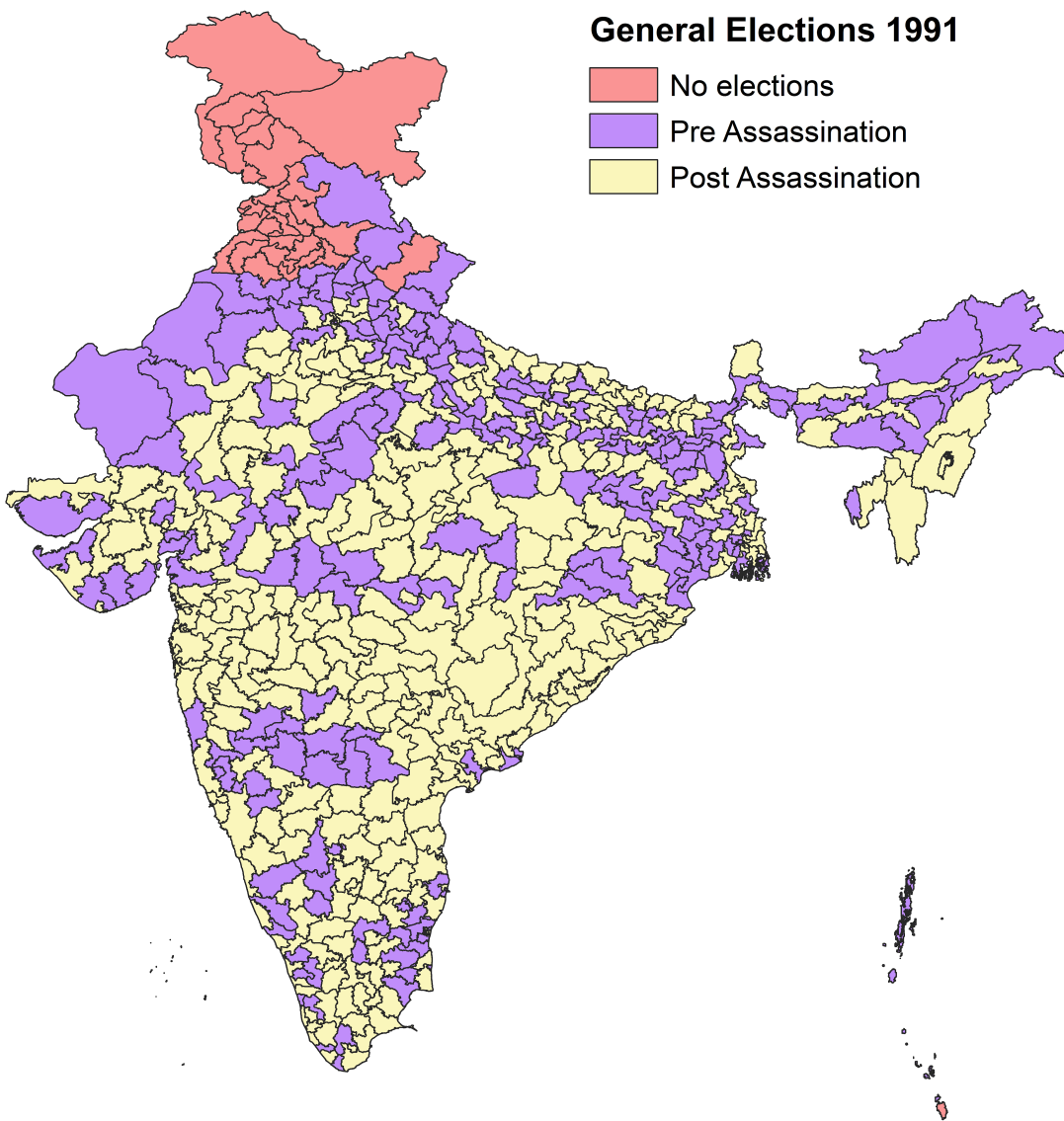
Notes: Mr Rajiv Gandhi was assassinated on May 21, 1991. Pre-assassination phase consists of polling held on 10th May and 20th. Post-assassination phase consists of poliing scheduled for 23rd May and 26th May (ultimately held on 12th June and 15th June). Due of political violence (unrelated to Rajiv Gandhi's assassination), elections were not held in Jammu and Kashmir and Punjab.

the vote share of the INC, and a negative effect on the vote share of the other two parties, it indicates irrational behaviour on the part of the voters. INC was not *expected* to win. Indeed opinion polls conducted by India Today (MARG India Today Exit Polls) suggested that if all elections were held on May 20 (date of phase 2 polls) INC would only win 190 seats, which would not be sufficient for them to form a majority government (see Figure A2).

4 Data, Empirical Specification and Descriptive Statistics

4.1 Data

Election reports published by the Election Commission of India provide rich and extensive information about the candidates (including their party, votes received and gender) the overall electorate, the number of electors who voted, and the type of the constituency (whether or not the constituency is reserved) and the date on the election was held in that constituency. Using this data we can also compute the turnout rate, the vote shares of each contesting party and the margin of victory for each constituency. Since we know the exact date the election was held in a particular constituency, we know whether the election was pre- or post-assassination. The constituency boundaries and reservation status of these constituencies remained unchanged over the period 1977–2008.[17]

4.2 Empirical Specification

To estimate the impact of Rajiv Gandhi's assassination on political outcomes for the different parties we use a difference-in-difference framework. To do this, we match constituencies across the 1989 and 1991 elections. The treatment seats in this case are the constituencies that voted in the post-assassination phase while the seats that voted in the pre-assassination phases are categorized as the control seats. We use the quasi-random assignment of seats

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[17]In India, the Delimitation Commission is the only legal mechanism for changing constituency boundaries and SC/ST reservation status for seats. There was one in 1972, which defined the constituencies until the next Delimitation Commission in 2008. That gives us consistent constituencies between the 1977 and the 2009 National Parliamentary elections. Delimitation Commissions were originally supposed to be formed after every census, but part of the 42nd Constitutional Amendment delayed the next commission until after the 2001 census. Prior to 1972, Delimitation Commissions were established in 1952 and 1962.

to phases to estimate the following regression

$$y_{pcst} = \beta_0 + \beta_1 \text{Year 1991} + \beta_2 \text{Post-assassination}$$
$$+ \beta_3 (\text{Year 1991} \times \text{Post-assassination}) + \gamma \mathbf{X}_{cst} + \mu_s + \varepsilon_{cst} \tag{11}$$

Here y_{pcst} denotes the electoral outcome of party p in constituency c in state s in year t; Year 1991 is a dummy variable that takes the value of 1 if the election year is 1991 and 0 otherwise; Post-assassination is a dummy that takes the value of 1 if the constituency is a post-assassination constituency. The effect of the assassination on electoral outcomes is given by $\hat{\beta}_3$ (the difference-in-difference estimate). $\mathbf{X}_{cst}$ includes a set of constituency level controls that include whether the constituency is reserved (SC reserved or ST reserved), the number of candidates standing for election in the relevant constituency and the percentage turnout (defined as the proportion of eligible voters who actually voted in the election). The reservation status of the constituency does not change over the two election rounds. μ_s includes a set of state fixed effects. Standard errors are clustered at the state level.

Additionally, $\hat{\beta}_1$ gives us the difference in outcomes for the pre-assassination constituencies in 1991 vs 1989; $\hat{\beta}_1 + \hat{\beta}_3$ gives us the difference in outcomes for the post-assassination constituencies in 1991 vs 1989; $\hat{\beta}_2$ gives us the difference in outcomes in between the post- and pre-assassination constituencies in 1989; and $\hat{\beta}_2 + \hat{\beta}_3$ gives us the difference in outcomes between the post- and pre-assassination constituencies in 1991.

For our identification strategy to be valid, we need to ensure that the assignment of seats to phases was not correlated with constituency specific political outcomes. Specifically we need to ensure that outcomes in 1989 did not drive assignment of seats to different phases in 1991. In Table 1 we present the mean and standard error of of the key constituency level outcomes in 1989 (margin of victory, turnout, likelihood of INC winning, likelihood of NF winning and the total number of contesting candidates) separately for the 1991 pre- and post-assassination (columns 1 and 2 respectively) seats. The differences (column 3) show that while several of the variables are significantly different across the two groups of constituencies, these variables do not jointly predict assignment (p-value of the joint F-test = 0.41, see column 4).[18]

In light of the discussion in Section 3, our focus will primarily be on the effect of the assassination of Rajiv Gandhi on the challenger (in this case the INC): did the unexpected assassination of Rajiv Gandhi lead to changes in electoral fortunes of the INC in the 1991 general elections? In order to have a complete understanding of the mechanisms behind this (for example at which other party's expense did INC benefit), we also consider the electoral outcomes of the other major national parties like the BJP and JD. Finally, while there was no National Front (coalition of non INC parties) in 1991, for ease of comparison with previous elections, we present the change in vote shares (and likelihood of victory) of the hypothetical National Front, defined as in 1989.

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[18]Column 4 presents the regression results when seat assignment (post-assassination seat) in 1991 is regressed on the seet of key constituency level outcomes in 1989.

Table 1: Did Phase assignment depend on outcomes in previous election?

	Pre-assassination (1)	Post-assassination (2)	Difference (3)	Regression (4)
Margin of victory in 1989	14.308	15.978	-1.670	0.000
	(0.877)	(0.636)		(0.002)
Turnout in 1989	62.289	59.657	2.632***	0.001
	(0.949)	(0.546)		(0.004)
INC Won 1989	0.244	0.453	-0.208***	0.025
	(0.032)	(0.027)		(0.062)
NF Won 1989	0.706	0.459	0.247***	0.037
	(0.034)	(0.028)		(0.070)
Number of Candidates 1989	12.906	10.596	2.310***	-0.003
	(0.881)	(0.338)		(0.002)
Constant				0.610*
				(0.316)
Joint F				1.05
				[0.41]
Number of States	13	21		30
Number of Constituencies	180	341		509

Notes: Column 4 presents the results from an OLS regression with the dependent variable = 1 if the constituency voted in the post-assassination phase in 1991. Column 4 presents the regression results when seat assignment (post-assassination seat) in 1991 is regressed on the seet of key constituency level outcomes in 1989. In column 4 the number in square brackets is the p-value for the joint F test. Standard errors in parenthesis. Standard Deviations in parenthesis. Significance: ***$p < 0.01$,** $p < 0.05$,* $p < 0.1$.

4.3   Descriptive Statistics

Columns 1 and 2 of Table 2 presents the averages across the two elections (1989 and 1991). Column 1 presents the means (vote shares of the different parties, likelihood of victory of the different parties, winning margin and turnout) for 1989 and column 2 the additional effect for 1991, which is obtained from a regression of the relevant outcome variable on a Year 1991 dummy, controlling for constituency level characteristics (reservation status of seats and number of contesting candidates). Vote shares of JD and the National Front are significantly lower in 1991 relative to 1989 (Panel A) as was the likelihood of JD winning a seat (Panel B).[19] Turnout percentage is significantly higher in 1989 relative to 1991, but there was no difference in terms of "competitiveness" of seats: the average margin of victory was not different across the two elections.

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[19]Panel A of Figure A3 presents the overall vote share of INC, BJP and JD (defined as the total number of votes received by the party as a proportion of total votes cast) in 1989 and 1991. There was a 10% decrease in the overall vote share of INC and a 34% decrease in the vote share of JD while BJP experienced a 75% increase in the vote share of BJP over the period 1989 to 1991.

In columns 3 and 4 we restrict our sample to the 1991 elections. Column 3 presents the averages vote shares of the different parties, likelihood of victory of the different parties, winning margin and turnout) for the pre-assassination seats; column 4 presents the additional effect for the post-assassination seats, obtained from a regression of the relevant outcome variable on a post-assassination dummy, controlling for constituency level characteristics (reservation status of seats and number of contesting candidates). Relative to the pre-assassination seats, INC vote share is statistically significant 4.4 percentage points (14% of the pre-assassination mean) higher in the post-assassination seats. This is matched by a statistically significant 2.4 percentage point reduction in the vote share of National Front and also a 3.67 percentage point reduction in the vote share of JD, though this effect is not statistically significant. Relative to the pre-assassination seats the likelihood of INC winning a seat is 16 percentage points (or 67%) higher in the post-assassination seats, matched with a 16 percentage point reduction in the likelihood of NF winning a seat. Overall, there is no difference in the turnout rate or the margin of victory between the post- and pre-assassination seats.[20]

Figures A4 and A5 in the Appendix, present, respectively, the vote shares and the position distribution of the three major parties (INC, BJP and JD) in the two phases of the 1991 Parliamentary elections. While the distribution of vote shares are different across the pre- and post-assassination phases (using the two sided Kolmogorov-Smirnov test, we reject the null hypothesis that the vote shares are the same), the increased vote share in the post-assassination phase is clear for INC (see Figure A4). Figure A5 shows clearly that the likelihood of INC winning a seat is substantially higher in the post-assassination phase relative to the pre-assassination phase (61.86 vs 22.29%); for JD it falls from 35.71 to 11.54%; and finally for BJP there is no change (24.72 vs 26.3%).

5   Results

We now turn to the regression results. Our primary aim is to investigate whether the assassination induced (non-responsive) shock leads to an increase in the vote share (Hypothesis 1) and winning probability (Hypothesis 2) of the Challenger (C), in this case the INC. Sections 5.1 and 5.2 present the results on the effects of the assassination on the vote shares and the likeihood of victory of the different parties. Section 5.3 links the key empirical results to the theoretical framework and the hypotheses in Section 2. In Section 5.4 we present additional results on the effect of the assassination: falsification tests (Section 5.4.1) that ensure that we are not erroneously rejecting the null hypothesis of no assassination effect; the effect of time from the event (Section 5.4.2); effects on constituency

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[20]Panel B of Figure A3 presents the overall vote share of INC, BJP and JD (defined as the total number of votes received by the party as a proportion of total votes cast) in pre- and post-assassination constituencies. There was a 24% increase in the overall vote share of INC and a 15% reduction in the vote share of JD following the assassination.

Table 2: Descriptive Statistics

	Year		1991	
	1989 (1)	Difference (2)	Pre-assassination (3)	Difference (4)
Panel A: Vote Share Percentage				
INC	40.89	-1.753	31.60	4.374**
		(2.641)	(1.09)	(1.888)
BJP	29.02	-1.214	22.20	-0.592
		(2.932)	(1.12)	(2.783)
JD	41.57	-17.801***	26.80	-3.660
		(3.968)	(1.72)	(5.079)
NF	35.93	-11.859***	24.99	-2.384**
		(2.273)	(0.95)	(0.879)
Other	2.51	-0.298*	1.70	0.202
		(0.152)	(0.13)	(0.132)
Panel B: Party Winning				
INC	0.38	0.064	0.22	0.146*
		(0.069)	(0.03)	(0.080)
BJP	0.17	0.057	0.24	-0.007
		(0.092)	(0.03)	(0.091)
JD	0.28	-0.153***	0.19	-0.076
		(0.053)	(0.03)	(0.064)
NF	0.45	-0.076	0.49	-0.164**
		(0.069)	(0.04)	(0.059)
Other	0.17	0.012	0.29	0.018
		(0.014)	(0.03)	(0.025)
Panel C: Other Constituency Level variables				
Margin	15.38	2.842	12.32	-1.708
		(2.017)	(0.86)	(2.973)
Turnout	60.62	-5.907***	58.15	0.602
		(1.075)	(0.95)	(2.366)
Number of Constituencies	507	521	180	341

Notes: In 1989, elections were held in 507 constituencies (no elections in Jammu and Kashmir, Punjab and Assam). In 1991, elections were held in 521 constituencies (no elections in Jammu and Kashmir and Punjab). Vote share denotes average percentage of votes received (conditional on contesting). Proportion of Seats won is the number of seats in which the party is victorious as a proportion of the total number of seats in which elections were held. In column 2, we present the coefficient estimate and standard error of the Year 1991 dummy, from a regression of the relevant outcome variable on a Year 1991 dummy, controlling for constituency level characteristics (reservation status of seats and number of contesting candidates). In column 4 we present the the coefficient estimate and standard error of the Post-assassination dummy, from a regression of the relevant outcome variable on the Post-assassination dummy, controlling for constituency level characteristics (reservation status of seats and number of contesting candidates). In columns 3 and 4, the sample is restricted to the 1991 elections. Standard errors, clustered at the state level are presented in parenthesis. Significance: ***$p < 0.01$,** $p < 0.05$,* $p < 0.1$.

level outcomes (Section 5.4.3); change in winning party (Section 5.4.4); and likelihood of winning by candidate characteristics (Section 5.4.5).

Before we proceed to the regression results we examine whether the assumption of parallel pre-trends holds. We consider the following thought experiment. We take as given the assignment of seats as of 1991 but instead of the assassination happening in 1991, assume that the assassination happened in 1989, i.e., assume that the (assigned) pre- and post-assassination phases in 1989 was punctuated by the assassination. We estimate a regression that is similar to equation (11), except now we compare the voteshares of INC in the 1984 and the 1989 elections. Relative to 1984, vote shares for INC in 1989 fell by 12.7 percentage points in the pre-assassination seats and by 10.8 in the post-assassination seats and the difference is not statistically significant ($p-value = 0.541$). This justifies our use of the difference-in-difference approach.

5.1 Vote Share

The regression results for the vote shares of the different parties are presented in Table 3. We include as additional controls the reservation status of the seat (SC Reserved, ST Reserved) and the number of candidates contesting in the seat. Columns 1, 2 and 3 present the results for the three main parties: INC (column 1), BJP (column 2) and JD (column 3).

Clearly the INC benefited from Rajiv Gandhi's assassination: the difference-in-difference estimate in column 1 is positive and statistically significant to the extent of 7.4 percentage points.[21] The assassination thus significantly benefitted INC in terms of gain in vote share. Note that while neither are statistically significant, the assassination has a negative effect on the vote share of both JD and BJP (see columns 2 and 3).

The bottom panel of Table 3 presents a set of difference estimates. Relative to the 1989 counterparts, INC vote share in 1991 is a statistically significant 6.5 percentage point lower in the pre-assassination seats but not in the post-assassination seats. This is consistent with the exit poll results presented in Figure A2. This suggests that far from becoming the winning party, in the absence of assassination, INC could very well have gone on to lose the election. Turning to the corresponding patterns for JD (and NF): we see that relative to its 1989 counterparts, in 1991, the vote share for JD are 16.4 percentage points and 18.4 percentage points lower in the pre- and post-assassination seats respectively. BJP also experienced a decline in vote share in the post-assassination seats in 1991, relative to its

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[21]We have 30 states/union territories in the sample and standard errors are clustered at the state level. To address the potential problems resulting from small number of clusters, we also compute the wild cluster bootstrap standard errors [see Cameron et al., 2008]. The results (in terms of statistical significance) are similar to those presented in Table 3.

Table 3: Assassination and Vote Shares of Parties

	INC	BJP	JD	National Front	Other Parties
	(1)	(2)	(3)	(4)	(5)
Year 1991	-6.534**	0.121	-16.386***	-9.574***	0.041
	(2.526)	(5.008)	(5.132)	(2.517)	(0.146)
Post-assassination	-1.546	1.499	-0.898	0.815	0.449
	(1.772)	(4.888)	(7.556)	(2.117)	(0.396)
Post-assassination × Year 1991	7.385***	-2.014	-2.025	-1.561	-0.351
	(1.668)	(4.161)	(6.262)	(3.003)	(0.262)
SC Reserved	-0.239	0.741	-0.594	1.309	0.545
	(0.753)	(0.960)	(1.545)	(0.778)	(0.347)
ST Reserved	3.668**	-2.017	-4.487	-4.315**	2.033**
	(1.694)	(3.179)	(4.061)	(1.943)	(0.788)
Number of Candidates	-0.022	0.042	-0.111	-0.127*	-0.031***
	(0.064)	(0.097)	(0.079)	(0.063)	(0.011)
Constant	41.764***	25.256***	42.740***	37.121***	1.834***
	(1.763)	(4.992)	(6.229)	(1.352)	(0.365)
Sample Size	978	684	541	1,618	11,879
Difference Estimates					
Pre-assassination 1991 − Pre-assassination 1989	-6.534**	0.121	-16.386***	-9.574***	0.041
	(2.526)	(5.008)	(5.132)	(2.517)	(0.146)
Post-assassination 1991 − Post-assassination 1989	0.851	-1.894	-18.41***	-11.14***	-0.310
	(2.411)	(2.251)	(4.839)	(2.393)	(0.207)
Post-assassination 1989 − Pre-assassination 1989	-1.546	1.499	-0.898	0.815	0.449
	(1.772)	(4.888)	(7.556)	(2.117)	(0.396)
Post-assassination 1991 − Pre-assassination 1991	5.838***	-0.516	-2.923	-0.746	0.0982
	1.683	2.589	5.345	2.038	0.297

Notes: OLS regression results presented. Dependent variable is the number of votes received by the party as a proportion of the total number of valid votes cast in the constituency. Regressions include state fixed effects. Standard errors, clustered at the state level in parentheses. Significance: ***$p < 0.01$,** $p < 0.05$,* $p < 0.1$.

1989 counterpart, though this difference is not statistically significant.

The second set of difference estimates show that there is no difference between the post- and pre-assassination seats in 1989: this is expected because for 1989 the (pre- and post-) categorization is a purely theoretical construct. However in 1991, INC vote share is 5.84 percentage point (or 26%) higher in the post-assassination period, relative to the pre-assassination period. There is no corresponding effect for either BJP or JD.

We summarize the main result relating to the assassination shock as follows:

Result 1 *The assassination shock increased the vote share of INC (the challenger).*

21

Table 4: Assassination and Likelihood of Party Winning

	INC	BJP	JD	National Front	Other Parties
	(1)	(2)	(3)	(4)	(5)
Year 1991	-0.028	0.105	-0.140*	0.034	-0.006
	(0.078)	(0.089)	(0.073)	(0.083)	(0.009)
Post-assassination	0.002	0.041	-0.039	0.008	-0.010
	(0.046)	(0.059)	(0.066)	(0.055)	(0.035)
Post-assassination × Year 1991	0.138*	-0.074	-0.018	-0.153*	0.015
	(0.083)	(0.074)	(0.072)	(0.082)	(0.013)
SC Reserved	0.020	-0.002	0.030	0.010	-0.030**
	(0.030)	(0.020)	(0.029)	(0.033)	(0.014)
ST Reserved	0.255***	-0.157	-0.113	-0.328***	0.073
	(0.068)	(0.103)	(0.088)	(0.077)	(0.072)
Number of Candidates	0.000	0.002	-0.002	-0.000	-0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)
Constant	0.357***	0.130**	0.322***	0.566***	0.077***
	(0.052)	(0.062)	(0.071)	(0.053)	(0.023)
Sample Size	1,028	1,028	1,028	1,028	1,028
Difference Estimates					
Pre-assassination 1991 − Pre-assassination 1989	-0.028	0.105	-0.140*	0.034	-0.006
	(0.078)	(0.089)	(0.073)	(0.083)	(0.009)
Post-assassination 1991 − Post-assassination 1989	0.110	0.0312	-0.158***	-0.119	0.00918
	(0.0751)	(0.0998)	(0.0559)	0.0729	0.00913
Post-assassination 1989 − Pre-assassination 1989	0.002	0.041	-0.039	0.008	-0.010
	(0.046)	(0.059)	(0.066)	(0.055)	(0.035)
Post-assassination 1991 − Pre-assassination 1991	0.140**	-0.0327	-0.0571	-0.145**	0.00461
	(0.0565)	(0.0542)	(0.0525)	(0.0648)	(0.0374)

Notes: OLS regression results presented. Dependent variable takes the value of 1 if the relevant party wins the seat; 0 otherwise. Regressions include state fixed effects. Standard errors, clustered at the state level in parentheses. Significance: ***$p < 0.01$,** $p < 0.05$,* $p < 0.1$.

5.2 Likelihood of Winning

In Table 4 we present the regression results for the effect of assassination on the likelihood of INC, BJP and JD winning the seat (columns 1–3), the likelihood of national front nominated candidates winning (column 4) and the likelihood of all other candidates winning (column 5) in the 1991 parliamentary elections. The results in column 1 of Table 4 show that the assassination effect is a large and statistically significant 13.8 percentage point increase in the likelihood of INC winning.

Relative to the pre-assassination seats, the average probability of INC winning in a post-assassination seat is 14 percentage points higher; matched with a decline of similar magnitude in the average likelihood of NF winning a seat in the post-assassination period. The

other result worth noting that relative to their 1989 counterparts, the average likelihood of JD winning a seat is significantly lower in both the pre- and post-assassination seats in 1991.

We summarize the main result relating to the effect of assassination shock as follows:

Result 2 *The assassination shock increased the average likelihood of INC winning a seat.*

5.3   Linking the Theory to the Empirical Results

As a result of Rajiv Gandhi's assassination, both the vote share and likelihood of INC winning increases (Results 1 and 2). We argue that this is consistent with voters behaving irrationaly.

Suppose the assassination was a responsive shock ($I_d = 1$ and $I_s = 0$). The timing of the shock and the institutional structure of Indian elections meant that the politicians and parties were unable to respond to this shock. According to our theoretical model, this is equivalent to $k = 0$. We know from Lemma 1, if $k = 0$, a responsive shock cannot affect electoral outcomes. Rational behaviour on the part of the voters, in the face of a responsive shock therefore cannot explain our results.

It is more realistic to interpret Rajiv Gandhi's assassination as a non-responsive shock ($I_d = 0$ and $I_s = 1$) affecting the sympathy level of the challenger. As we argue in Hypotheses 1 and 2, a non-responsive shock can affect electoral outcomes (vote shares and probability of winning) if and only if $\rho < 1$, i.e., voters are not fully rational. The empirical results (Results 1 and 2) can, therefore, be explained by irrational voting behaviour, which allows perceptions about candidates (i.e., voteshares) and also the likelihood of winning to be affected by a non-responsive shock.

5.4   Additional Empirical Results

While not the primary focus of the paper, we discuss in this section several additional results relating to Rajiv Gandhi's assassination. The purpose of these additional analyses is to better understand the effects of the assassination.

5.4.1   Placebo Tests

We want to ensure that we are not erroneously rejecting the null hypothesis of no assassination effect. An intuitive and simple way to test this is to randomly re-assign constituencies to pre-assassination and post-assassination constituencies to create "fake" assassination effects. We essentially implement a set of placebo/falsification tests.

We compare the estimated effect of $\hat{\beta}_3$ from our main specification (given by equation (11)) to a distribution of $\hat{\beta}_3$, which we obtain in the following manner: first, we reallocate constituencies to the two groups (pre- and post-assassination or control and treatment seats) randomly, but ensuring that the sample sizes of our new groups match that of our baseline specification. Second, we estimate our assassination effect using these new pre- and post-assassination groups and save the estimates. Finally, we repeat this exercise 10,000 times and save the estimates from each iteration. If in our main results, we were erroneously rejecting the null hypothesis that our coefficient of interest is equal to 0 (i.e., we were attributing a positive assassination effect that does not exist in reality), the placebo coefficients should be very close to the true coefficient. Figure 4 presents the probability density function of the 10,000 placebo point estimates of $\hat{\beta}_3$: In Panel A, the dependent variable is the vote share of INC while in Panel B the dependent variable is the likelihood of INC winning the seat. In Panel A, point estimates generated by the falsification test for $\hat{\beta}_3$ are always less than the true estimates in all cases respectively. In Panel B, the point estimates generated by the falsification test for $\hat{\beta}_3$ are less than the true estimates in 99.92% of cases respectively. We are therefore not erroneously rejecting the corresponding null hypotheses.

5.4.2   Did the Effect of the Shock Diminish over Time?

The effect of sympathy is likely to fall over time. Jasperson [2006, page 176] argues that "... *the more time that passes after the tragedy, the greater the likelihood that the sympathy effect will dissipate*". To examine whether that is the case here we examine whether the assassination effects vary between Phases 3 and 4. Recall that the election for Phase 3 was conducted on June 12 while that for Phase 4 was conducted on June 15. Our regression specification is given by

$$
\begin{aligned}
y_{pcst} =& \alpha_0 + \alpha_1 \text{Year 1991} + \alpha_2 \text{Phase 3} + \alpha_3 (\text{Year 1991} \times \text{Phase 3}) \\
&+ \alpha_4 \text{Phase 4} + \alpha_5 (\text{Year 1991} \times \text{Phase 4}) + \gamma \mathbf{X}_{cst} + \mu_s + \varepsilon_{cst}
\end{aligned} \tag{12}
$$

Our coefficients of interest are $\hat{\alpha}_3$ and $\hat{\alpha}_5$, which are the assassination effects in Phase 3 and Phase 4 respectively. The estimated coefficients and the 90% confidence intervals for effect of assassination on the vote shares and the likelihood of victory for INC are presented in Figure 5. In Panel A, the dependent variable is the voteshare of party p in constituency c in state s in election year t. In Panel B, the dependent variable is the likelihood of party p

Figure 4: Simulated Assassination Effect. INC

Panel A: Vote share INC	Panel B: Likelihood of Victory. INC
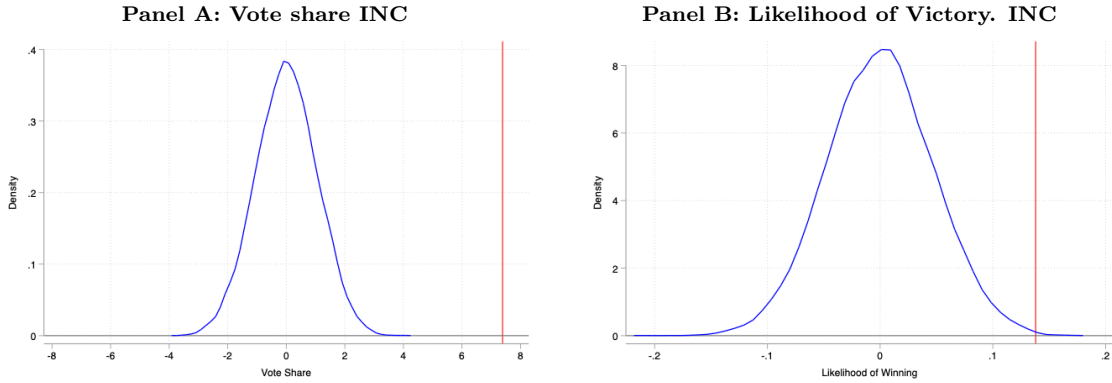
Notes: Dependent variable in Panel A is vote share of INC in constituency c in state s in year t. Dependent variable in Panel B is the likelihood of INC winning in constituency c in state s in year t. Regression specification given by equation (11). The true and simulated effects of $\hat{\beta}_3$ (assassination effect) are presented. Distribution of of simulated effects based on 10000 bootstrapped estimates. The true estimate of $\hat{\beta}_3$ is denoted by the vertical straight line.
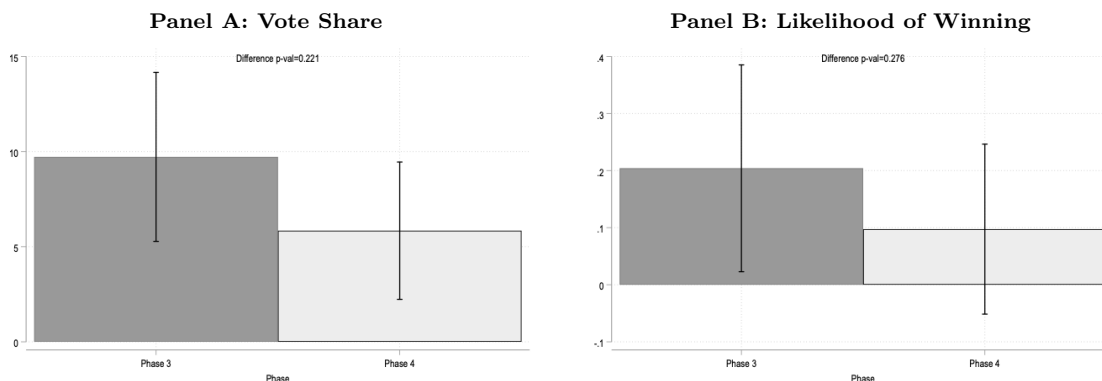
winning in constituency c in state s in election year t. Assassination results in a statistically significant increase in voteshares of INC in both periods (by 9.83 and 5.97 percentage points in Phases 3 and 4 respectively) and also an increase in the likelihood of victory for INC in both phases (20.4 percentage points in Phase 3 and 9.75 percentage points in Phase 4, though the latter effect is not statistically significant). However, while vote share effect is lower by 4 percentage points in Phase 4 and the likelihood of winning is lower by almost 11 percentage points, the difference in effects are not statistically significant (difference p-value = 0.221 in Panel A and difference p-value = 0.276 in Panel B). In terms of direction, evidence suggests that the sympathy effect dissipates over time; but the rate of dissipation here is slow.

5.4.3   Effects on Constituency Level Outcomes

Table 5 presents the effects of the assassination on constituency level outcomes: turn out percentage (column 1) and the margin of victory (column 2). The regression specification is given by equation (11), though the outcome variables are different. Turn out percentage denotes the proportion of electorates who cast their vote. Margin of victory is the difference between the vote share of the first and second placed candidates as a proportion of the vote share of the winner (first placed candidate).

The regression results presented in column 1 indicate that the assassination resulted in

Figure 5: Effect of Time from Event on Vote shares and Likelihood of Winning. INC

Notes: Estimated values of α_3 and α_5 from equation (12) and 90% confidence interval presented. In Panel A, the dependent variable is the voteshare of party p in constituency c in state s in election year t. In Panel B, the dependent variable is the likelihood of party p winning in constituency c in state s in election year t. Estimating sample restricted to INC.

a 2.4 percentage point lower turn out. A possible explanation is as follows. Consider a voter who has a preference for a particular political party. The incentive of this voter to vote is directly proportional to the probability with which she believes that her preferred candidate will win. Following the assassination, a voter who was still not in favour of INC saw a slim chance of her preferred candidate winning and had a lower incentive to vote. Consequently, the turnout decreased because of the assassination, which further helped the INC improve its performance.

Notice though that the reduction in turnout is less than the increase in INC vote share as a result of the assassination. It is quite likely that some JD and BJP supporters possibly chose not to vote. Consider a voter who has a preference for a particular political party. The incentive of this voter to vote is directly proportional to the probability with which she believes that her preferred candidate will win. Following the assassination, a voter who was not in favour of INC saw a slim chance of her preferred candidate winning and had a lower incentive to vote. However, even if we assume that all thse absent voters would have voted for parties other than INC, that would have not changed the results. INC benefitted from either a shift on the part of undecided voters who now choose to vote for INC or voters who would otherwise have not voted, choosing to turn up and vote for INC. Available data does not allow us to separate out which of the two effects are driving these results.

However we do not find any evidence that the assassination of Rajiv Gandhi had an effect on the extent of political competition. As the results in column 2 imply, the assassination does not have a statistically significant effect on the margin of victory.

Table 5: Assassination and Constituency Level Outcomes

	Turnout (1)	Margin (2)
Year 1991	-4.125***	-1.979
	(1.129)	(1.659)
Post-assassination	2.625	0.659
	(1.692)	(2.721)
Year 1991 × Post-assassination	-2.385*	1.603
	(1.355)	(2.212)
SC	-0.469	0.851
	(0.775)	(1.342)
ST	-7.468***	0.524
	(1.497)	(1.393)
Constant	59.792***	14.766***
	(1.327)	(2.145)
Sample Size	1,028	1,028
Difference Estimates		
Pre-assassination 1991 – Pre-assassination 1989	-4.125***	-1.979
	(1.129)	(1.659)
Post-assassination 1991 – Post-assassination 1989	-6.509***	-0.376
	(1.258)	(1.836)
Post-assassination 1989– Pre-assassination 1989	2.625	0.659
	(1.692)	(2.721)
Post-assassination 1991 – Pre-assassination 1991	0.240	2.2622
	(1.292)	(2.217)

Notes: Turn out percentage denotes the proportion of electorates who cast their vote. Margin of victory is the difference between the vote share of the first and second placed candidates as a proportion of the vote share of the winner (first placed candidate). Regressions include state fixed effects. Standard errors, clustered at the state level in parentheses. Significance: ***$p < 0.01$,**$p < 0.05$,*$p < 0.1$.

5.4.4 Change in Winning Party

Recall from the results presented in Table 4 that relative to the elections held in the pre-assassination phase, assassination resulted in a 13.8 percentage point increase in the likelihood of INC winning a seat matched by a 15 percentage point reduction in NF winning a seat. We now investigate whether, conditional on the party that had been the winner in 1989, did the assassination result in a change in winning party? The regression specification is given by

$$\Delta_{cs} = \alpha_0 + \sum_p \alpha_{1p} \text{Winner } 1989_p + \alpha_2 \text{Post-assassination}$$

$$+ \sum_p \alpha_{3p} \text{Post-assassination} \times \text{Winner } 1989_p + \gamma \mathbf{X}_{cs} + \mu_s + \varepsilon_{cs} \quad (13)$$

The dependent variable Δ_{cst} is a dummy variable that takes the value 1 if the winning party in constituency c in state s is different in the two elections. The regression results are presented in Table 6. Consistent with the results presented in Table 4, we see that relative to the pre-assassination phase, in the post-assassination phase, INC were almost 42 percentage points less likely to lose a seat that they had held in 1989, whereas JD were 18 percentage points more likely to lose a seat they held in 1989.[22]

5.4.5   Likelihood of Winning, by Candidate Characteristics

The patterns presented in Table 4 investigates the effect of the assassination shock on the likelihood of each party winning. In the different constituencies parties are represented by nominated candidates. In this sub-section we examine whether the assassination shock has heterogeneous impacts depending on the contesting candidate. In particular we examine whether the effects are different between (a) male and female candidates; (b) incumbent and new candidates; (c) recontesting and new candidates; (d) loyal and turncoat candidates. The regression specification is given by

$$
\begin{aligned}
y_{pcst} =& \eta_0 + \eta_1 \text{Year } 1991 + \eta_2 \text{Post-assassination} + \eta_3 (\text{Year } 1991 \times \text{Post-assassination}) \\
&+ \xi_0 \mathbf{Z} + \xi_1 \mathbf{Z} \times \text{Year } 1991 + \xi_2 \mathbf{Z} \times \text{Post-assassination} \\
&+ \eta_3 (\mathbf{Z} \times \text{Year } 1991 \times \text{Post-assassination}) \\
&+ \gamma \mathbf{X}_{cst} + \mu_s + \varepsilon_{cst} \quad (14)
\end{aligned}
$$

The regression results are presented in Table 7. The dependent variable in these regression is the likelihood of INC winning. The estimated effect $\hat{\eta}_3$ is the one of interest: if $\hat{\eta}_3$ is significantly different from 0, then we conclude that the assassination had heterogenous impacts depending on the characteristics of the candidate. The estimated values of $\hat{\eta}_3$ (coefficient estimate of $\mathbf{Z} \times$ Post-assassination $\times$ Year 1991) is never statistically significant. The assassination increases the likelihood of INC winning, irrespective of who the contesting candidate is.

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[22]Correspondingly the difference estimates in column 2 show that in the post-assassination phase, the National Front were 12 percentage point more likely to lose a seat that they held in 1989.

Table 6: Assassination and Change in Winning Party

	(1)	(2)
INC Winner 1989	0.065	-0.174
	(0.126)	(0.216)
BJP Winner 1989	-0.130	
	(0.304)	
JD Winner 1989	-0.026	
	(0.143)	
National Front Winner 1989		-0.304**
		(0.144)
Post-assassination	-0.045	-0.301
	(0.096)	(0.213)
Post-assassination × INC Winner 1989	-0.374**	-0.089
	(0.146)	(0.259)
Post-assassination × BJP Winner 1989	0.012	
	(0.318)	
Post-assassination × JD Winner 1989	0.223*	
	(0.119)	
Post-assassination × NF Winner 1989		0.418*
		(0.235)
SC Reserved	-0.069	-0.074*
	(0.043)	(0.041)
ST Reserved	-0.034	-0.025
	(0.049)	(0.046)
Number of Candidates	0.001	0.000
	(0.002)	(0.002)
Constant	0.524***	0.760***
	(0.079)	(0.144)
Sample Size	521	521
Difference Estimates:		
INC Winner 1989: Post-assassination – Pre-assassination	-0.419***	-0.391***
	(0.122)	(0.117)
BJP Winner 1989: Post-assassination – Pre-assassination	-0.0333	
	(0.304)	
JD Winner 1989: Post-assassination – Pre-assassination	0.178**	
	(0.0647)	
NF Winner 1989: Post-assassination – Pre-assassination		0.116**
		(0.0445)

Notes: Dependent variable: Change in Winner in constituency c in state s. OLS regression results presented. Regression specification given by equation (13). Sample restricted to 1991 Parliamentary elections. Regressions include state fixed effects. Standard errors, clustered at the state level in parentheses. Significance: $^{***}p < 0.01,^{**}p < 0.05,^{*}p < 0.1$.

Table 7: Candidate Characteristics and Likelihood of Winning: INC only

	Male vs Female **Z**=Female Candidates (1)	Incumbent vs New **Z**=Incumbent Candidates (2)	Recontesting vs New **Z**=Recontesting Candidates (3)	Turncoat vs Loyal **Z**=Turncoat Candidates (4)
Year 1991	-6.444**	-7.728***	-9.164***	-6.084***
	(2.578)	(2.620)	(1.863)	(2.153)
Post-assassination	-1.194	-1.322	-1.549	-1.332
	(1.856)	(1.850)	(1.721)	(1.734)
Post-assassination × Year 1991	7.598***	7.640***	7.831***	7.223***
	(1.721)	(1.968)	(1.773)	(1.501)
Z	1.715	-0.674	-0.677	6.597**
	(1.295)	(1.714)	(1.337)	(2.746)
Z× Year 1991	-0.415	5.120***	5.843***	-7.715
	(1.472)	(1.854)	(1.476)	(6.049)
Z × Post-assassination	-1.810	0.322	0.480	-1.268
	(2.232)	(1.812)	(1.501)	(2.149)
Z× Post-assassination × Year 1991	-1.519	-2.679	-1.882	1.808
	(3.337)	(3.013)	(2.575)	(6.613)
SC Reserved	-0.359	-0.325	-0.165	-0.646
	(0.753)	(0.728)	(0.774)	(0.783)
ST Reserved	3.679**	3.342*	3.283**	3.492*
	(1.728)	(1.675)	(1.530)	(1.738)
Number of Candidates	-0.027	-0.027	-0.020	-0.028
	(0.065)	(0.067)	(0.068)	(0.065)
Constant	41.537***	41.972***	42.013***	41.545***
	(1.859)	(1.778)	(1.431)	(1.727)
Sample Size	978	978	978	978
Difference Estimates				
Post 1991 − Post 1989				
Reference	1.154	-0.0880	-1.333	1.140
	(2.160)	(3.044)	(2.830)	(2.346)
Z	-0.781	2.353	2.628	-4.768
	(4.524)	(2.097)	(2.249)	(4.302)
Post 1991 − Pre 1991				
Reference	6.404***	6.318***	6.282***	5.891***
	(1.517)	(1.433)	(1.799)	(1.634)
Z	3.075	3.961	4.880**	6.431
	(2.739)	(2.534)	(1.947)	(5.550)
Reference	Male	New	New	Loyal
Z	Female	Incumbent	Recontesting	Turncoat

Notes: Each column presents the results from a separate heterogeneity regression. Column 1: Male vs Female candidates; Column 2: New vs Incumbent candidates; Column 3: New vs Recontesting Candidates; Column 4: Loyal vs Turncoat candidates. OLS regression results presented. Regression specification given by equation (14). Dependent variable = 1 if INC Wins, 0 otherwise. Regressions include state fixed effects. Standard errors, clustered at the state level in parentheses. Significance: ***$p < 0.01$,** $p < 0.05$,* $p < 0.1$.

6 Conclusion

The literature on voter behaviour has long been interested in evaluating voters' competence to fulfil their electoral responsibility. This literature focuses on whether voters are rational. Empirically, this literature addresses the question of irrationality by investigating how electoral outcomes (voter behaviour) is affected by exogenous shocks beyond the control of the politicians. The idea is that, with rational voters, these shocks should not affect incumbents' electoral fortunes. If electoral outcomes are affected due to such shocks, we then have evidence of voter irrationality. However, a more recent strand of literature argues that even if voters are rational, exogenous shocks could affect incumbents' electoral fortunes since such shocks can provide voters an opportunity to update their beliefs about the ability of the candidates if such shocks are responsive shocks, allowing the politicians and political parties to respond. Evidence of electoral fortunes responding to exogenous shocks cannot, on its own, entail the conclusion that voters are irrational.

This necessitates a shock that does not provide the voter any new information about the ability of the contesting candidates. We call such a shock a *non-responsive* shock. If voters are fully rational, then a non-responsive shock should have no effect on voting patterns. If, on the other hand, a non-responsive shock affects voting patterns, we can say that voters are irrational.

The 1991 Parliamentary election in India, where Rajiv Gandhi (ex-Prime Minister, leader of the opposition INC party and possible Prime Minister, should INC win) was assassinated between different phases of polling provides us with such a shock. There was nothing the contesting candidates could do post-assassination, as all arrangements relating to the election, post-election was under the purview of the fiercely independent Election Commission of India. Therefore, voters gained no new information about the ability of the candidates post assassination. However, the assassination resulted in a sympathy wave that saw a significant increase in the vote share of INC and a significant increase in the likelihood of victory for INC candidates in the post-assassination phase. We conclude that our results are suggestive of irrational behaviour on the part of Indian voters.

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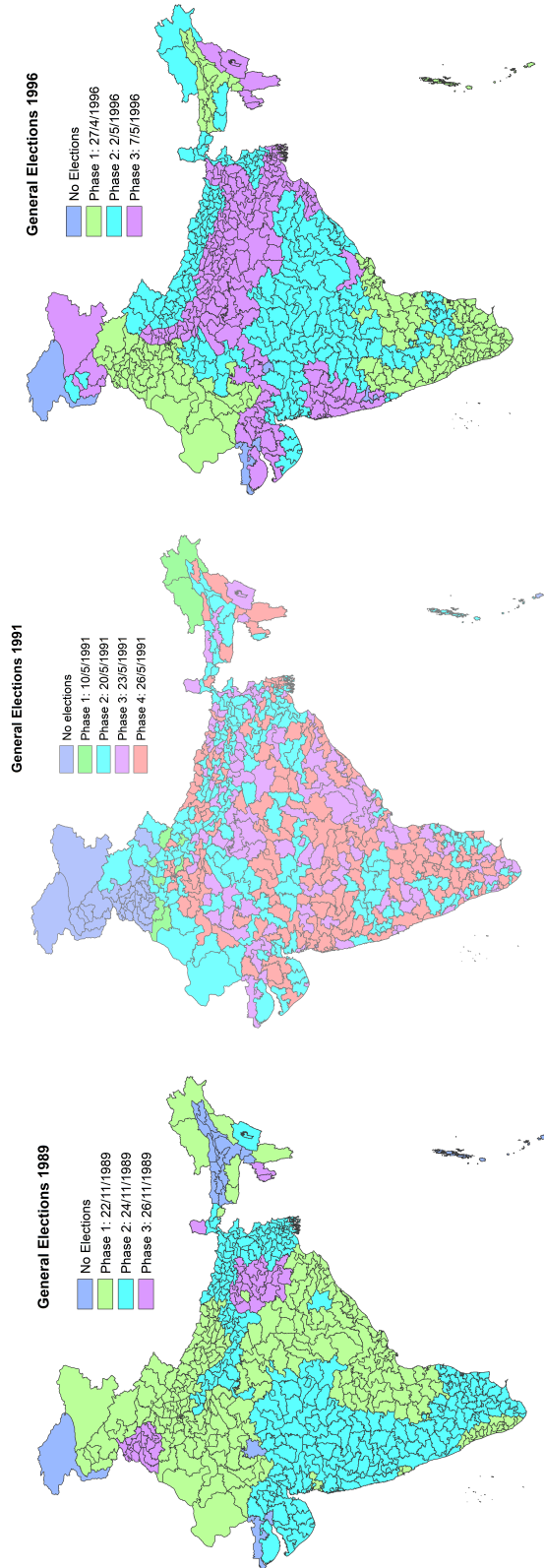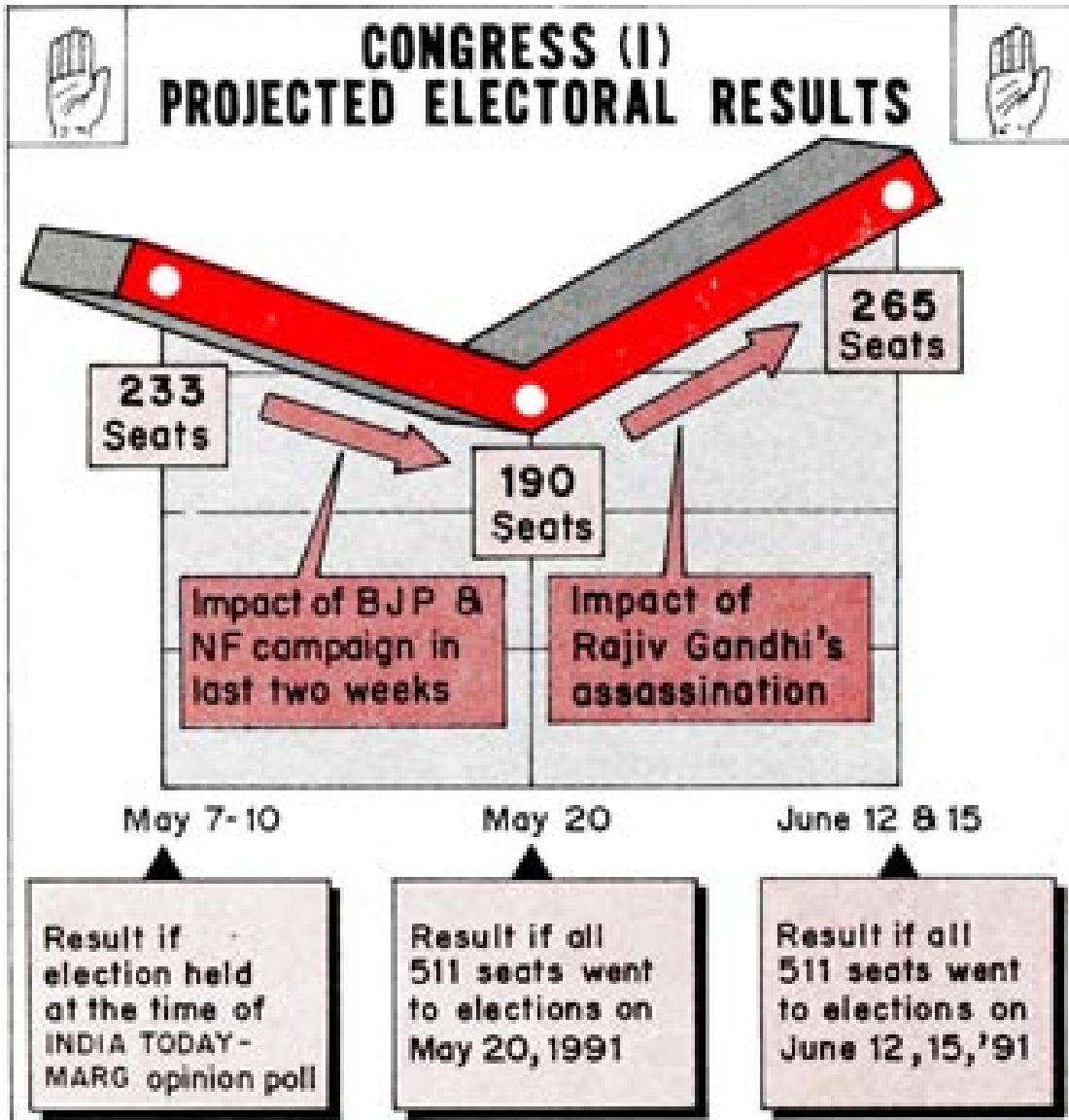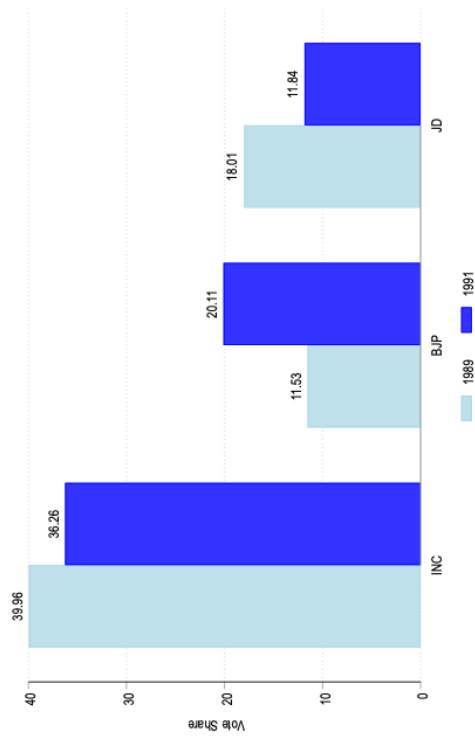Figure A1: Phases of Election. National Parliamentary Elections in 1989, 1991 and 1996
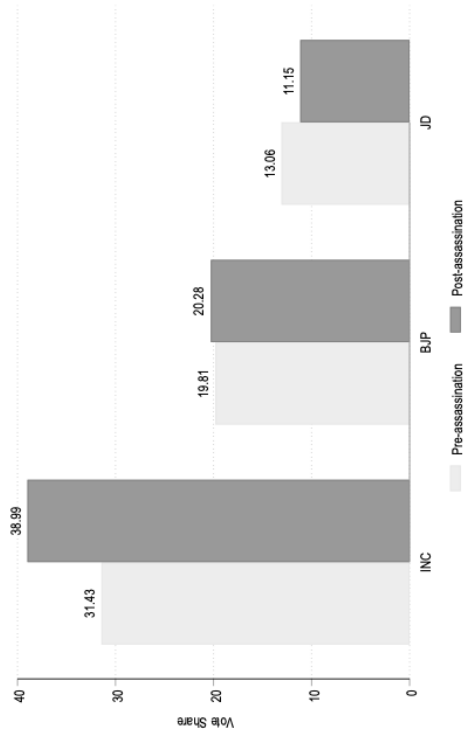
Figure A2: Exit Polls

Notes: India Today Exit Polls 1991

Figure A3: Overall Voteshare by Parties in the two elections

Panel A: 1989 vs 1991
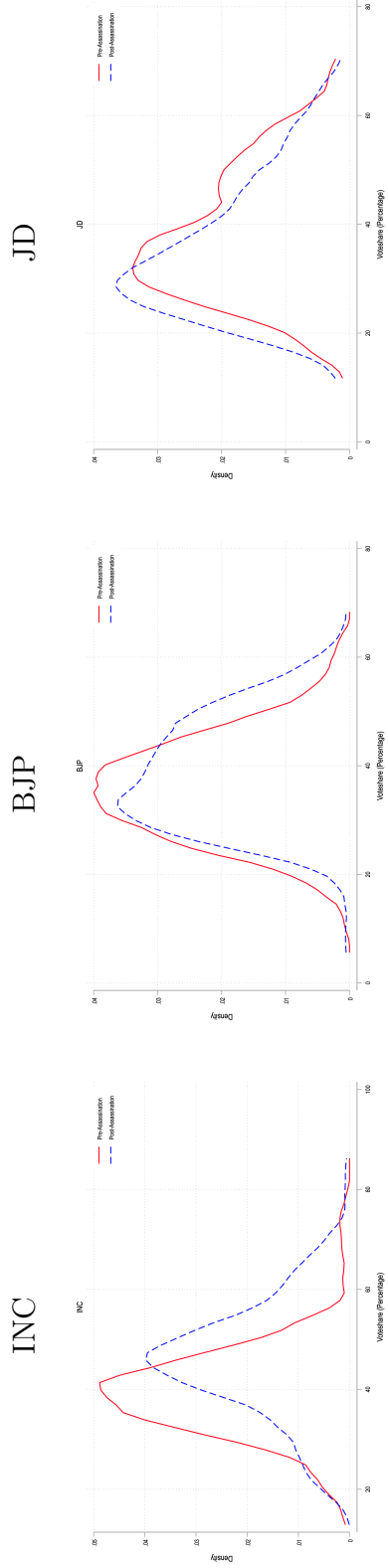
Panel B: Pre- vs Post-assassination (1991)

Notes: Total votes received by party as a proportion of total number of votes cast presented.

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Figure A4: Distribution of Voteshares 1991. Pre- and Post-Assassination Phases

Notes: Voteshares of INC, BJP and JD in the pre- and post-assassination phases of the 1991 National Elections presented. Kolmogorov-Smirnov test for equality of distributions (p-value): 0.000 (INC); 0.051 (BJP); 0.000 (JD)

Figure A5: Distribution of Position 1991. Pre- and Post-Assassination Phases
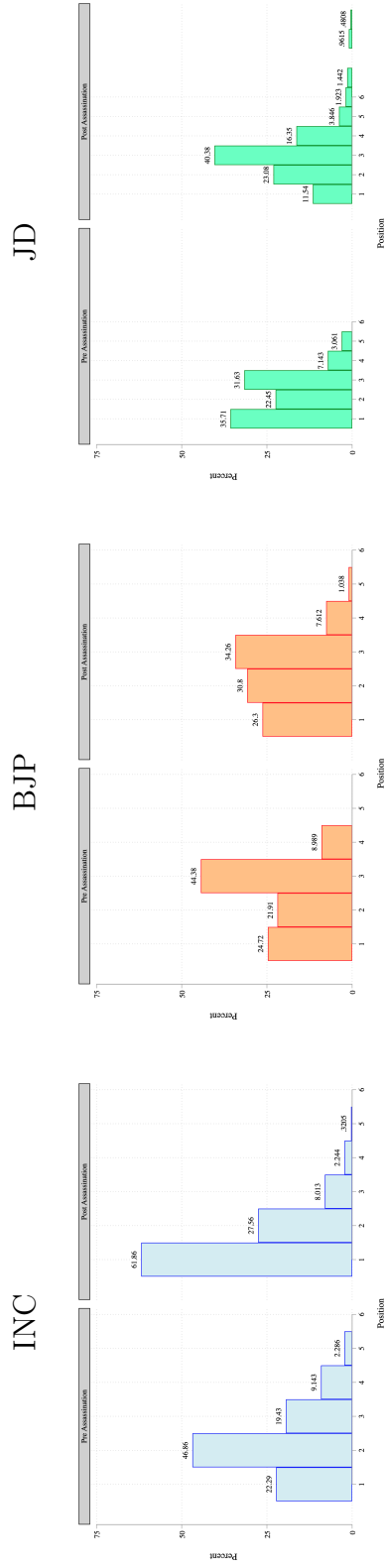
Notes: Distribution of position of INC, BJP and JD in the pre- and post-assassination phases of the 1991 National Elections presented. Position 1 denotes winner.