

NOTA: THE CHOICE OF MUGWUMPS?

RAGHAV KUMAR

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*Name of the Student* : RAGHAV KUMAR

*Registration Number* : PG180019857

*Name and Designation  
of the Supervisor* : Dr. Srikant P  
Associate Professor,  
Madras School of Economics,  
Chennai - 600025

# Bonafide Certificate

This is to certify that this Project Report titled “**NOTA: The Choice of Mugwumps?**” is the bona fide work of Mr. Raghav Kumar who carried out the project under my supervision. It is certified further, that to the best of my knowledge the work reported herein does not form part of any other project report based on which a degree or award was conferred on an earlier occasion on this or any other candidate.

Dr. Shanmugam  
Professor and Director,  
Madras School of Economics,  
Chennai-600025

Dr. Srikant P  
Professor,  
Madras School of Economics,  
Chennai-600025

# Abstract

I show the normalized vote percentage garnered by the salient independent reduces with the introduction of NOTA. This fall can be explained by a corresponding increase in NOTA's normalized vote share. The aforementioned negative relation differs in intensity for different states and regions of the country. In particular, I find the relation to be the strongest in south India and the weakest in west India. The results confirm my hypothesis that NOTA serves as a better alternative for those unwilling to vote for political parties (or the candidates fielded by them).

# Acknowledgements

I would like to express my sincere gratitude to Mr T.S. Krishnamurthy, former Chief Election Commissioner. He was instrumental in helping me streamline the research question and lead me to resources whenever I could not make progress. My interaction with him was beneficial on multiple levels. It helped me understand the motivations of the Election Commission for pushing NOTA as electoral reform. It also made me reconsider the practicality of choosing NOTA in an election. Lastly, it introduced me to experiences of NOTA in other countries and his vision of how NOTA can be further strengthened.

Next, I would like to thank Dr Srikant P. for mentoring this dissertation project. From staying overtime on campus to discussing new hypotheses on late night calls, Dr Srikant has gone the extra mile to guide me. There was a constant flux of unexplored concepts that I had to read and understand to match his pace. This learning experience was immensely satisfying. He has the uncanny ability to stimulate my thinking which is probably why I enjoyed our brainstorming sessions more than I enjoy my classes.

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# 1 Introduction

## 1.1 Background

People’s Union for Civil Liberties (PUCL, for short) filed a petition in 2004 challenging the constitutional validity of the Conduct of Election Rules, 1961. Their argument - these rules <sup>1</sup> do not protect voter’s secrecy in the event he chooses not to vote for any candidate. On 27 September 2013, the Supreme Court delivered a judgement directing the Election Commission to include None Of The Above (NOTA) option in Electronic Voting Machines (EVMs) and ballot papers. To express their disapproval before NOTA, voters would often cast empty ballots or mark ballots more than once, making it an invalid vote<sup>2</sup>. The Supreme Court hoped NOTA will not only maintain voter’s secrecy but also give a voice to these disgruntled voters, bring down the cases of bogus voting, improve the quality of candidates fielded by political parties and increase voter participation<sup>3</sup>. NOTA was not just the initiative of PUCL, however. The push for NOTA came from the Election Commission itself - first in 2001, under James Lyngdoh, and then in 2004, under T.S. Krishnamurthy.

Following the Supreme Court judgement, NOTA was introduced as a fictional candi-

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<sup>1</sup>Specifically, rules 41(2), 41(3) and 49-O. 41(2) and (3) directed the voter who took the ballot and decided not to use it to return it to the presiding officer. These ballots were then kept in a separate packet. Rule 49-O catered to the voter who, in the polling booth, chose not to cast vote and put it on record.

<sup>2</sup>S.Y. Quraishi, “Pressure of a Button”, The Indian Express, 3 October 2013, <https://indianexpress.com/article/opinion/columns/pressure-of-a-button/>, accessed on 20 March 2020.

<sup>3</sup>People’s Union for Civil Liberties v Union of India (2013): Writ Petition (Civil) No 161 of 2004, Supreme Court judgment dated 27 September 2013.

## 1 Introduction

date in elections<sup>4</sup>. However, this fictional candidate could never win! Suppose there are 2 candidates in an election- candidate X and NOTA and 1000 people turn up to vote. If 999 people vote NOTA and only one votes for X, then X wins. The votes polled for NOTA are not considered when deciding the winner of the election, they are treated as invalid votes<sup>5</sup>. Essentially, NOTA can be read as a departure from “One Person, One Vote” principle since NOTA votes explicitly state refusal to choose a candidate but are not counted to decide the winner<sup>6</sup>.

So is NOTA just an ineffective political tool - a gun without bullets? What prompts voters to go to the election booth and cast NOTA, given it is of no consequence in deciding the winner? Are they making this choice rationally or just voting randomly on a whim? Does the introduction of NOTA increase participation in elections? Does it change the patterns of voting from the pre-NOTA period? I focus on the last question in this project.

## 1.2 Overview

The term **mugwump** is an adjective used to describe a person who remains aloof from party politics<sup>7</sup>. A mugwump who did not want to vote for a candidate with political clout had two options before NOTA was introduced. First, he could reason that all candidates running for an election have political influence and abstain from voting. Second, he could argue that candidates backed by political parties have more influence than others and therefore vote for an independent candidate. Since he must now choose from a pool of lesser-known candidates, he likely chooses the independent with the highest recall value.

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<sup>4</sup>In 2013, voters in Chhattisgarh, Madhya Pradesh, Mizoram, Delhi and Rajasthan had the option of choosing NOTA in the state elections. Meghalaya, Nagaland, Tripura and Karnataka had state elections before the Supreme Court judgement and therefore voters were not given the NOTA option. First general elections with NOTA in the fray was held in 2014.

<sup>5</sup>S.Y. Quraishi, “Pressure of a Button”.

<sup>6</sup>However, in 2018 Maharashtra SEC and Haryana SEC decreed that if NOTA option got the maximum votes in an election, fresh elections will be held.

<sup>7</sup>Definition from Google Dictionary.

## *1 Introduction*

Interestingly, NOTA gives him a third option - to not choose any candidate at all! He gets to vote and also avoid candidates with political influence. Hence, NOTA should be a better alternative than voting for the salient independent candidate. This is indeed the case! I show NOTA is the preferred choice for the Indian mugwump voters.

## 2 Literature Review

Even though studies of NOTA in India are few, a long line of work exists to understand why people vote and why they don't. Harder and Krosnick [2008] give a bird's eye view of the motivations to vote. Among others, factors like education, the health of the economy, age are believed to positively affect turnout in the U.S. elections. They also point out to **period effect** as a possible reason for high turnout in some age groups. A period effect is a phenomenon where a generation of voters show up in large numbers in elections because a significant event in their life (a war, for example) influenced them politically. This leads to a higher voter turnout in a particular age group of the populace. Downs [1957] and Rosenthal and Sen [1973] model voter's decision to vote as a rational cost-benefit analysis, on the lines of Hotelling's seminal beach problem. The reward of voting is having one's preferred candidate in office<sup>1</sup> and the general utility from participating in election. The lost time in voting and moving away from one's ideal candidate are modelled as cost. However, Gelman et al. [1998] show that the probability of being pivotal in a large election is extremely small. But if this probability is tiny relative to its cost, then why do people vote? This is called the **Paradox of Voting** in political science literature. Dhillon and Peralta [2002] give an overview of voter turnout theories, attempting to solve this paradox and others<sup>2</sup>.

It is not just net utility gained that influences turnout in an election. For instance, Gomez et al. [2007] show participation in an election decreases with rainfall. Specifically

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<sup>1</sup>Weighted by the probability of one's vote being pivotal in sending the preferred candidate to office.

<sup>2</sup>Namely, **Paradox of Indeterminacy** and **Paradox of Ignorance**.

## 2 Literature Review

for U.S. presidential elections, an increase in an inch of rainfall decreases the voter participation by 1%. Fraga and Hersh [2011] show that weather impacts elections but the impact reduces as the elections become more competitive.

Superti [2017] departs from the Downsian tradition of looking at voting from the perspective of cost-benefit analysis. She argues that Blank and Null Votes (BNV) is a form of political expression and not irrational behaviour. Using natural experiments in Italy and Basque Country, she shows BNV is used by educated voters to voice disapproval. Hence, it should be considered as a 'sophisticated form of protest', separate in class from abstention or organized protest. Rosenthal and Sen [1973] and Superti [2015] also suggest abstention to be a steady phenomenon. Abstention is less sensitive to short term changes and often driven by long term factors in contrast to BNV which varies with short term fluctuations in politics.

The nexus between BNV and voter participation has been of considerable interest. Sweden, for instance, gives voters the option of casting a blank vote. The turnout in Sweden has historically been high, averaging around 85% despite blank votes getting 1% Katju [2013]. In many countries across the world, NOTA has no teeth. However, if a high number of BNV can lead to re-election, the effect on turnout might be promising<sup>3</sup>. For instance, NOTA was introduced in Bangladesh in 2008<sup>4</sup>. The draft law called for re-election if NOTA received more than 50% of the valid votes. Voter participation went up dramatically in 2008 parliamentary elections even though NOTA votes cast were less than 1% Katju [2013]<sup>5</sup>. Studies on the Indian experience are, however, inconclusive. Kadekodi and Hangodimath [2015] study elections in Karnataka from 1999-2013. They conclude

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<sup>3</sup>I say 'might be promising' because most studies consider correlation between NOTA and turnout, but not the causality.

<sup>4</sup>Other countries (and states) like Brazil, Greece, Finland, Chile, Nevada (USA) etc also allow voters to cast a blank vote. All of these countries, except Finland, follow a compulsory voting system.

<sup>5</sup>NOTA option in Bangladesh has since been discontinued (see Miazee & Irani, "EC officials, civil society for 'no' vote", Dhaka Tribune, 1 August 2017 <https://www.dhakatribune.com/bangladesh/politics/2017/08/01/ec-officials-civil-society-no-vote> , accessed on 20 March 2020).

## 2 Literature Review

that people voting NOTA were new voters, who would have otherwise not voted<sup>6</sup>. They also find that constituencies with higher per capita income and exposure to English media are more likely to choose NOTA. Vachana and Roy [2018] use data of Indian elections from 2013-2016. They use the correlation coefficient between NOTA and turnout in various state elections to conclude that NOTA need not lead to a higher turnout. They also find that reserved constituencies and constituencies affected by left-wing extremism (LWE) rank among the top ones to poll NOTA. NOTA votes are higher in constituencies where there is a direct contest between BJP and the Congress. They conclude that Indian voters are using NOTA to protest against what they perceive wrong in the political system. This piece of literature seems to confirm Superti's [2017] interpretation of BNV as a sophisticated protest.

Lastly, there is evidence that a candidate's position on the electoral ballot can affect the outcome of an election. Taebel [1975] shows when the recall value of a candidate is low and Massachusetts type ballots<sup>7</sup> are used, the position on the ballot can have a major impact on electoral victory. Koppell and Steen [2004] use the rotation of names in New York Democratic primaries to show that the first position on the ballot can improve chances of winning the election. With this perspective, placement of None Of The *Above* option at the end of the ballot/EVM might explain its abysmal share in the Indian elections<sup>8</sup>.

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<sup>6</sup>It must however be noted that this result is not statistically conclusive.

<sup>7</sup>This ballot type only lists the candidates. The motivation is to make voting candidate-centric, rather than party-centric.

<sup>8</sup>Maybe placing NOTB (None Of The Below) as the first option can increase its vote-share. This idea is explored in Atanu Biswas, "More psychological than an empowering voter option", The Hindu, 26 February 2020, <https://www.thehindu.com/opinion/op-ed/more-psychological-than-an-empowering-voter-option/article30915956.ece> , accessed on 20 March 2020.

### 3 Data and Methodology

Trivedi Centre for Political Data LokDhaba [2019] gives details of elections to the lower house of Parliament (Lok Sabha) and the states' legislative assembly (Vidhan Sabha). I use data of all such elections from 2008 till 2019. I remove 2008 state elections in Tripura, Meghalaya and Nagaland since they were conducted before delimitation carried by the Election Commission. Table 3.1 summarizes the key variables. Table 3.2 gives correlation matrix for the key variables.

### 3 Data and Methodology

Table 3.1: Summary Statistics of Key Variables

Variable Name	Description	Mean	Std. Dev.	Min	Max
n_cand	Number of nominated candidates in a constituency, excluding NOTA	14.535	8.945	2	185
turnout_percentage	Percentage of registered voters who turn up to vote	68.373	11.856	7.88	98.25
enop	Effective number of political parties in a constituency	3.168	1.013	1.08	12.5
vote_share_percentage	Percentage vote share garnered by a candidate	8.175	15.033	0	96.31
deposit_lost	Dummy, 1 if Yes 0 if No	0.813	0.39	0	1
ind_vote_share	Percentage vote share of independent candidate in a constituency	1.454	4.631	0	80.67
nota_vote_share	Percentage vote share garnered by NOTA in all elections	1.226	0.919	0.08	13.78
nota_vote_share_gen	Percentage vote share garnered by NOTA in elections to Lok Sabha	1.099	0.704	0.14	5.04
nota_vote_share_state	Percentage vote share garnered by NOTA in elections to Vidhan Sabha	1.251	0.954	0.08	13.78

Table 3.2: Correlation Matrix for Indian Election Dataset

Variables	n_cand	turnout_percentage	enop	vote_share_percentage	deposit_lost
n_cand	1				
turnout_percentage	-0.2607	1			
enop	0.2022	-0.2541	1		
vote_share_percentage	-0.1712	0.1049	-0.0818	1	
deposit_lost	0.148	-0.0869	0.0299	-0.9305	1



### 3 Data and Methodology

A voter who did not want to vote for a candidate with political clout had two options before NOTA was introduced. First, he could reason that all candidates running for an election have political influence and abstain from voting. Second, he could argue that candidates backed by political parties have more influence than others and therefore vote for an independent candidate. Since he must now choose from a pool of lesser-known, independent candidates, he likely chooses the independent with the highest recall value. NOTA gives him a third option-to not choose any candidate at all. He gets to vote and also avoid candidates with political influence. Hence, **NOTA should be a better alternative than voting for the salient independent candidate**<sup>1</sup>. This is the hypothesis I test.

For each election in a constituency  $i$ , I normalize the vote share of all independent candidates and NOTA. Even in the same constituency, the number of mugwumps can change from election to election. Normalization ensures the popularity of NOTA and the salient independent is studied *relative to* other independent candidates. Salient independent is the one who wins the maximum votes out of all the independent candidates<sup>2</sup>. I study the change in salient independent's vote share pre and post NOTA by running the following regression:

$$postpre_i = \alpha + \beta_1(nota\_percoftotal_i) + \beta_2(nota\_vote\_share_i) + \beta_3(postpre\_ncand\_nota_i) + \epsilon_i \quad (3.1)$$

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<sup>1</sup>For the aforementioned voter, NOTA should also be better than abstaining. However, in this project, I focus on the alternative of voting for independents rather than not voting at all. For a brief analysis on correlation between NOTA and turnout, see Appendix.

<sup>2</sup>By definition, it is not necessary for the same candidate to hold the salient independent title in multiple elections.

### 3 Data and Methodology

Where,

*postpre* : Difference (post-preNOTA) of normalized vote share of salient independent

*nota\_percoftotal* : NOTA's normalized vote share

*nota\_vote\_share* : NOTA's vote share percentage in the election

*postpre\_ncand\_nota* : Difference (post-preNOTA) in number of independent candidates<sup>3</sup>.

If NOTA is a better alternative than voting for the most notable independent, we expect  $\beta_1 < 0$ .

---

<sup>3</sup>Since NOTA is an alternative to voting for independents, it is counted as one of the candidates in the post-NOTA period. The results do not change if it's not.

## 4 Results and Analysis

Table 4.1 gives the central findings of this dissertation project<sup>1</sup>. This table gives results of regression 3.1 for all elections combined, elections to the Lok Sabha and elections to the Vidhan Sabha of various states. The coefficient of normalized NOTA share is negative and significant in all three elections. This confirms our hypothesis. Majority of the decline in salient independent's vote share is being bagged by NOTA. In Vidhan Sabha elections, a unit increase in NOTA's normalized vote share translates to a 0.8 unit decrease in salient independent's normalized vote share. A "unit" in this case is 1 percentage point. Figure 4.1 gives a pictorial representation of the results<sup>2</sup>.

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<sup>1</sup>For summary statistics of the variables used in the regression, see Table 6.1 in Appendix.

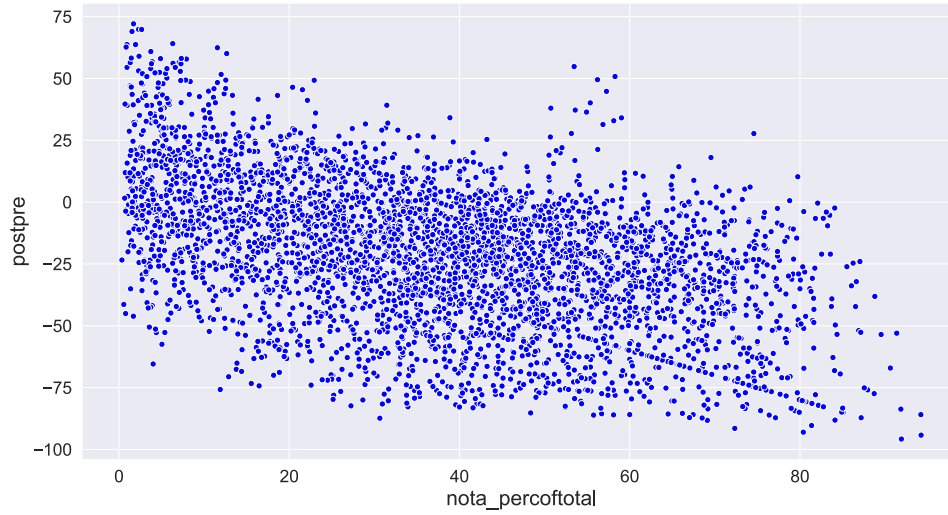
<sup>2</sup>The figure is only for the overall elections. Fig 6.1 and 6.2 for Lok Sabha and Vidhan Sabha elections respectively can be found in the Appendix.

#### 4 Results and Analysis

Table 4.1: Robust Regression Results for All, Lok Sabha and Vidhan Sabha Elections

Variable Name	Overall	Lok Sabha	Vidhan Sabha
	postpre	postpre	postpre
nota_percoftotal	-0.787*** (0.0178)	-0.685*** (0.0477)	-0.802*** (0.0188)
nota_vote_share	1.019** (0.435)	0.846 (1.430)	1.122** (0.456)
postpre_ncand_nota	-3.696*** (0.104)	-2.303*** (0.181)	-3.958*** (0.118)
Constant	9.021*** (0.834)	9.834*** (2.086)	9.019*** (0.894)
Observations	4,013	513	3,500
R-squared	0.407	0.377	0.418
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Figure 4.1: NOTA vs Change in Salient Independent's Share



#### 4 Results and Analysis

Figure 4.2 gives another piece of finding in favour of our hypothesis. It shows an inverse relationship between the number of independent candidates and vote share won by NOTA in a constituency. Lesser the number of independents, higher the vote share garnered by NOTA on average. NOTA is perceived as a substitute for independent candidates. The scattergram provides at least some support for this statement.

Figure 4.3 contrasts the median number of independent candidates by constituency type. Vachana and Roy [2018] show NOTA polled is higher in constituencies that are reserved and/or affected by left-wing extremism. Since reserved constituencies have lesser number of independent candidates, a lack of alternatives for mugwumps might be a reason why we see high NOTA polling here.

With the introduction of NOTA, the voting distribution for candidates except the top three becomes more uniform<sup>3</sup>. If NOTA increases the options to avoid influential candidates, then the mugwump votes get distributed more thinly. Hence, it is only natural for the voting distribution to become more uniform.

Table 4.2 gives the regression results for North, East, West and South India respectively<sup>4</sup>. In this table, the coefficient of *nota\_percoftotal* is negative and statistically significant for all regions. NOTA appears to be a relatively popular alternative in south India, even after controlling for the difference in number of independents. Similarly, the negative relation between the fall in salient's vote share and the rise of NOTA is relatively weak in west India.

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<sup>3</sup>For details, see Appendix B.

<sup>4</sup>The list of states that make up these regions is included in Table 5.2 in the Appendix.

#### 4 Results and Analysis

Figure 4.2: Number of Independent Candidates vs NOTA Vote Share

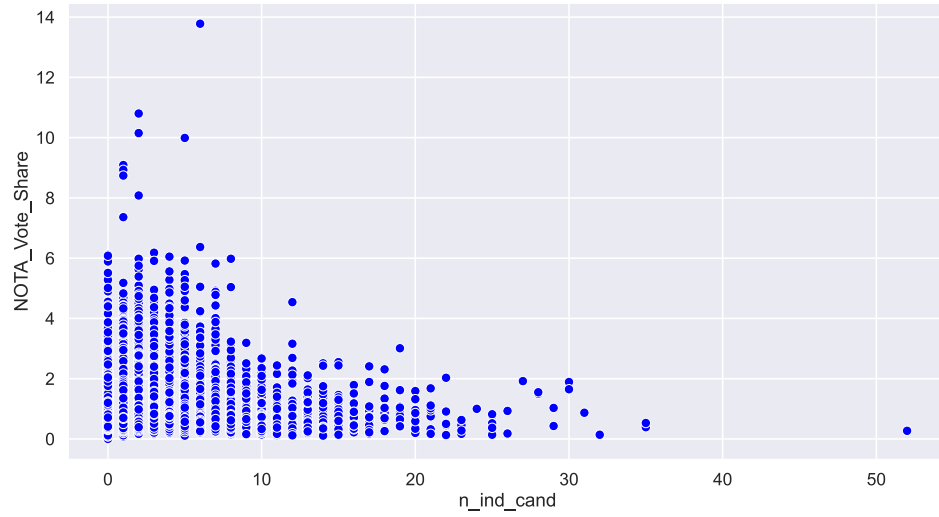
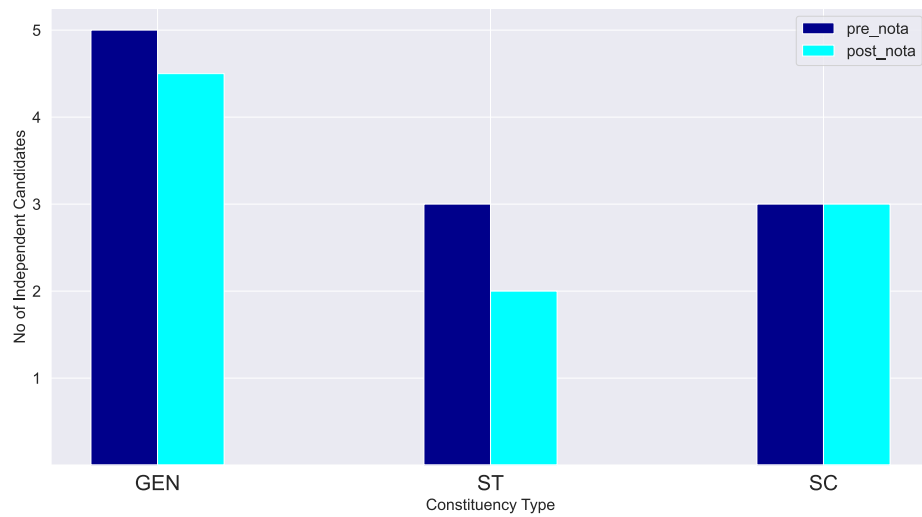


Figure 4.3: Median Number of Independent Candidates by Constituency Type



#### 4 Results and Analysis

Table 4.2: Regression Results for Different Regions of India

Variable Name	North	West	East	South
	postpre	postpre	postpre	postpre
nota_percoftotal	-0.819*** (0.0384)	-0.762*** (0.0382)	-0.843*** (0.0385)	-0.970*** (0.0361)
nota_vote_share	-1.775 (1.745)	1.437 (0.982)	2.221*** (0.712)	9.761*** (1.395)
postpre_ncand_nota	-4.472*** (0.229)	-3.125*** (0.185)	-4.252*** (0.283)	-3.584*** (0.195)
Constant	11.51*** (1.984)	6.200*** (1.622)	6.376*** (2.127)	12.87*** (1.766)
Observations	932	1,015	658	1,110
R-squared	0.415	0.390	0.486	0.438
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

## 5 Conclusion

In a nutshell, Indian mugwump voters previously had the option of either abstaining or voting for independent with the highest recall value. I hypothesized NOTA to be the preferred alternative for such voters. I studied the change in salient independent's vote share, normalized by the vote share of all independents and NOTA to show the following:

1. The decline in salient independent's share is bagged by NOTA. Overall, a percentage point increase in NOTA's share is correlated with a decline of 0.78 percentage point in salient independent's share.

2. The inverse relation in point 1 differs with region. The effect in southern India is the strongest (-0.97) while in western India is the weakest (-0.76).

3. That NOTA is being perceived as an alternative for mugwumps is supported by two ancillary findings. First, the voting distribution is becoming more uniform with the introduction of NOTA. Second, percentage NOTA polled is inversely related to the number of independent candidates in the fray.

However, there are a few limitations to this analysis. First, except Assam and Meghalaya, there is an underrepresentation of northeastern states. Most observations drop due to unavailability of either pre or post-NOTA values required for the regression. Second, the number of observations available for the final regression is low. This problem can be a source of bias in the results.



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## 6 Appendix A

Table 6.1 summarizes the variables used in regression 3.1. This table highlights the following:

1. On average, the normalized vote share of salient independent reduces once NOTA is introduced.
2. On average, NOTA wins about 37% of the normalized vote share.

## 6 Appendix A

Table 6.1: Summary Statistics of Regression Variables

Variable Name	Mean	Std. Dev.	Min	Max
postpre	-21.32567	28.45674	-95.80838	72.08255
nota_percoftotal	37.46569	21.12832	0.3466491	94.23077
nota_vote_share	1.211313	0.8438085	0.12	8.225
postpre_ncand	0.5367464	3.7828	-17.5	89

Figure 6.1: NOTA vs Change in Salient Independent's Share (Lok Sabha)

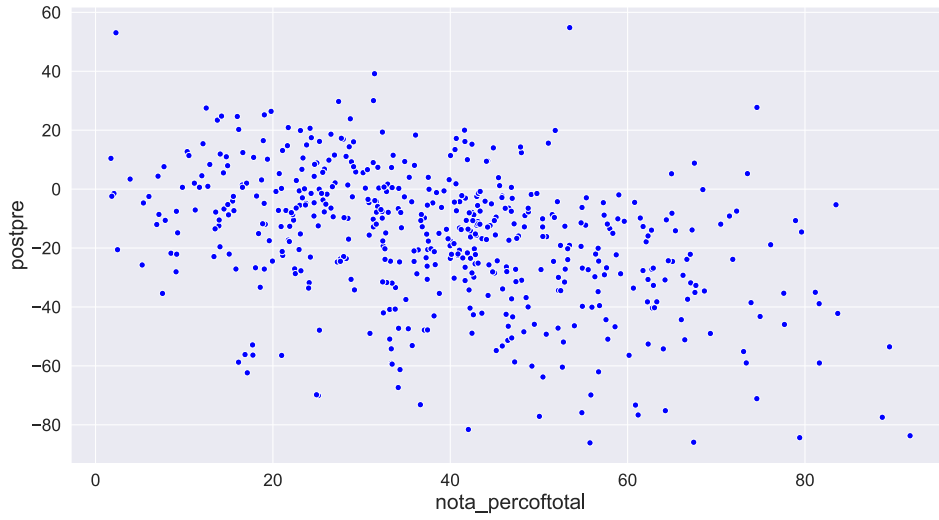
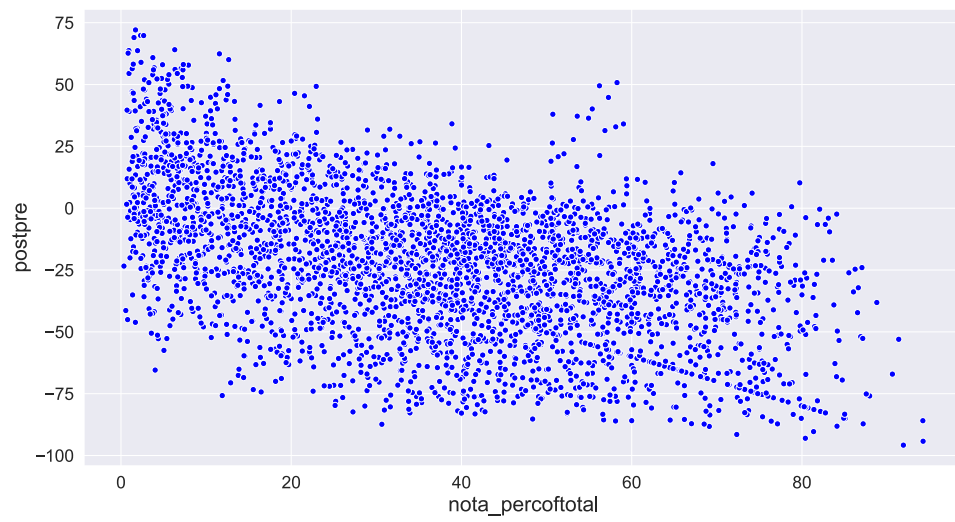


Table 6.2: Bifurcation of States in Different Regions of India

North	West	East	South
Jammu&Kashmir	Rajasthan	Bihar	Andhra Pradesh
Himachal Pradesh	Madhya Pradesh	West Bengal	Karnataka
Punjab	Gujarat	Jharkhand	Lakshadweep
Chandigarh	Daman Diu	Odisha	Kerala
Uttarakhand	Dadra Nagar Haveli	Chhattisgarh	Tamil Nadu
Haryana	Maharashtra		Puducherry
Delhi	Goa		Andaman Nicobar Islands
Uttar Pradesh			Telangana

Figure 6.2: NOTA vs Change in Salient Independent's Share (Vidhan Sabha of all states)



## 7 Appendix B

I remove the top three candidates in an election. On average, the top three candidates make up about 90% of the cumulative vote share in a constituency (Fig 7.1). To see how the randomness of voting changes with NOTA, I use two measures - KL Distance and Wasserstein Distance. A higher proximity to uniform distribution would indicate more randomness in voting. This proximity will be measured by the KL Distance and Wasserstein Distance. The results are shown in figure 7.2 and 7.3. The purple color of bars is an overlap of the pre and post distributions. It is clear from both the measures that the distribution is becoming more random/uniform in the post NOTA period. If NOTA increases the options to avoid influential candidates, then the mugwump votes get distributed more thinly. Hence, it is only natural for the voting distribution to become more uniform.

Figure 7.1: Top Candidates vs Cumulative Vote Share in Indian Elections

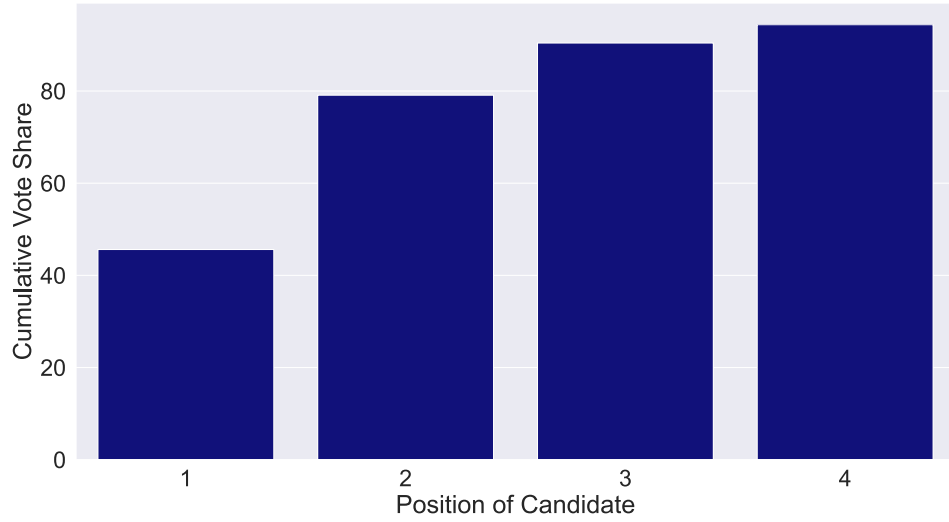


Figure 7.2: KL Distance Pre and Post NOTA

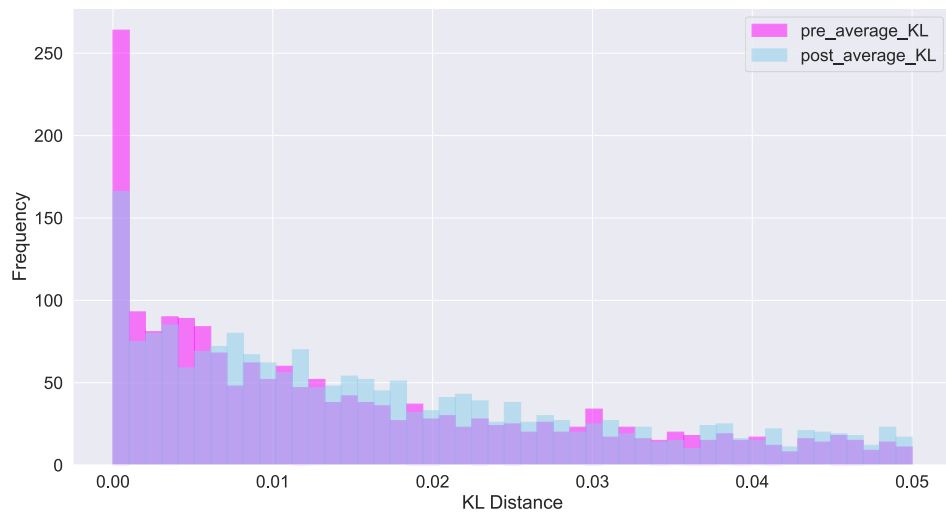
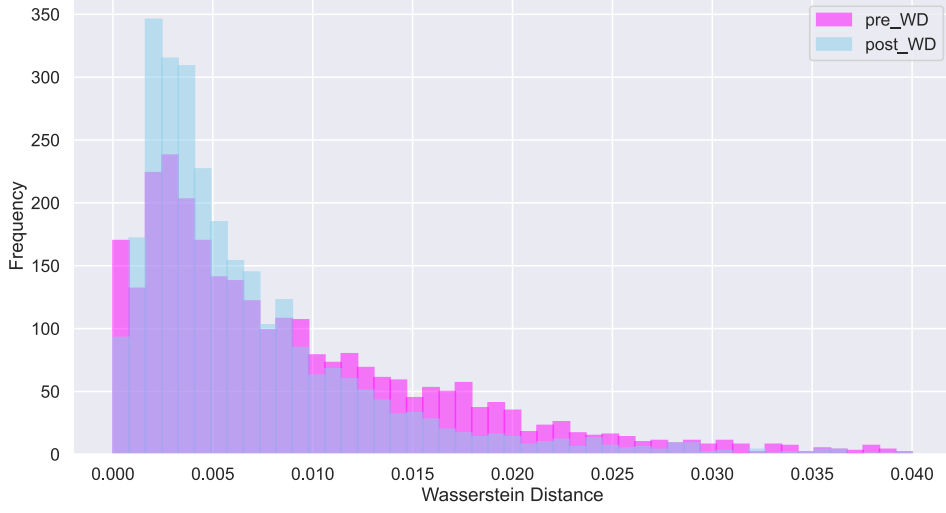


Figure 7.3: Wasserstein Distance Pre and Post NOTA



## 7.1 Estimating The Number of Fence Sitters

The randomness in voting can be estimated using Hirschman-Herfindahl Index as well. I use data from Trivedi Centre for Political Data LokDhaba [2019] on elections to the Lok Sabha and Vidhan Sabha of all states from 2008 onwards<sup>1</sup> and generate a Hirschman-Herfindahl Index (HHI) to measure the spread of voting. HHI for  $i^{\text{th}}$  constituency with  $T$  nominated candidates, each with a vote share proportion<sup>2</sup> of  $\alpha_k \forall k \in 1, 2, \dots, T$  is defined as:

$$HHI_i = \sum_{k=1}^T \alpha_k^2$$

HHI value lies between 0 and 1 and can be interpreted as a numerical measure of election competitiveness. For instance, if there are 5 nominated candidates in a constituency

<sup>1</sup>2008 is chosen due to the delimitation exercise carried by the Election Commission of India. The states of Tripura, Meghalaya and Nagaland were removed because they were conducted in 2008 but prior to delimitation.

<sup>2</sup>Defined as valid votes polled for candidate upon total valid votes in constituency.



## 7 Appendix B

and the first candidate received all the valid votes polled, HHI for such an election equals 1. Similarly, if there are 5 nominated candidates with each receiving same proportion of the valid votes, i.e., 0.2 then HHI for such an election equals 0.2. In general, if there are  $N$  candidates, each receiving  $1/T$  proportion of votes, then HHI equals  $1/T^3$ . Therefore, an HHI value close to 1 represents concentrated voting among a few candidates whereas a value close to  $1/T$  represents nearly equal division of votes among the candidates.

To estimate the number of people voting randomly, we assume a race between 2 candidates - A and B. Assume that  $n_A + n_B$  votes are polled in total,  $n_A$  for candidate A and  $n_B$  for candidate B. Also assume  $n_A > n_B$ . The observed vote shares for candidate A and B can therefore be written as

$$f_A^{Obs} = \frac{n_A}{n_A + n_B}$$

$$f_B^{Obs} = \frac{n_B}{n_A + n_B}$$

There will also be some who did not vote. Let us represent them by  $o$ . We can therefore write the total electors as  $n_A + n_B + o = N$ . Total votes of candidates as a fraction of total electors can be written as

$$f_A = \frac{n_A}{n_A + n_B + o}$$

$$f_B = \frac{n_B}{n_A + n_B + o}$$

HHI observed can be written as:

$$H^{Obs} = \frac{n_A^2}{(n_A + n_B)^2} + \frac{n_B^2}{(n_A + n_B)^2}$$

We also define HHI Total  $H^{tot}$  as the sum of vote share proportion squared of all candidates. Vote share proportion, in this case, is defined as valid votes polled upon

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<sup>3</sup>Naturally with equal vote proportion, as  $T \rightarrow \infty$ ,  $HHI_i \rightarrow 0$ .

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total electors.

$$H^{tot} = \frac{n_A^2}{(n_A + n_B + o)^2} + \frac{n_B^2}{(n_A + n_B + o)^2}$$

Let  $p$  represent voter participation rate:

$$p = \frac{n_A + n_B}{n_A + n_B + o} = \frac{n_A + n_B}{N}$$

Suppose some of these people vote randomly. The number of these voters is given by  $\epsilon (< o)$ . Since these voters are voting randomly, we can expect that over repeated experiments/simulations, half of these votes will go to candidate A and the other half to candidate B. The new, observed vote shares of candidates become:

$$f_A^{NewObs} = \frac{n_A + \epsilon/2}{n_A + n_B + \epsilon}$$

$$f_B^{NewObs} = \frac{n_B + \epsilon/2}{n_A + n_B + \epsilon}$$

Similarly, new HHI observed can be written as:

$$H^{NewObs} = \frac{(n_A + \epsilon/2)^2}{(n_A + n_B + \epsilon)^2} + \frac{(n_B + \epsilon/2)^2}{(n_A + n_B + \epsilon)^2}$$

Also,

$$H^{NewTot} = \frac{(n_A + \epsilon/2)^2}{(n_A + n_B + \epsilon + o)^2} + \frac{(n_B + \epsilon/2)^2}{(n_A + n_B + \epsilon + o)^2}$$

By expanding  $H^{NewTot}$  and assuming  $\epsilon^2/2$  to be reasonably small, it can be proven that:

$$p^2 \cdot H^{NewObs} = H^{NewTot}$$

Expanding RHS of the equation above, we have:

$$p^2 \cdot H^{NewObs} = \frac{n_A^2 + n_B^2 + \epsilon(n_A + n_B)}{N}$$

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Adding and subtracting  $2n_A n_B$  and solving for  $\epsilon$  we have:

$$\epsilon = \frac{H_{obs} N^2 p^2 - (n_A - n_B)^2 - 2n_A n_B}{(n_A + n_B)} \quad (7.1)$$

Here,  $\epsilon$  are the total number of random voters in a 2 candidate election. All the variables on the RHS of equation (0.1) are reported by the Election Commission of India making it possible for us to estimate the number of fence sitters from the reported variables in the dataset.

To be consistent with the assumption of race between 2 candidates, I restrict my attention to those contests where the vote is mainly split between two candidates or highly concentrated with one candidate<sup>4</sup>. The results from applying equation 6.1 are reported in Table 7.1.

My results suggest that average random voters in a constituency increase with the introduction of NOTA (last row). However, these results are not homogeneous. With NOTA, average random voters show a decline in Lok Sabha constituencies and constituencies of 17 states(for elections to Vidhan Sabha). But they do show an upward trend in constituencies of 13 states.

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<sup>4</sup>To do this, I arrange the candidates in each constituency in decreasing order of their vote share and check the number of candidates it takes to reach 50% or more cumulative vote. If this number is less than or equal to 2, I assume that it is a 2 candidate contest. I also remove those contests that have only 1 candidate in the fray. The idea is to find effective number of political parties in the contest. This criterion is essentially random. I intend to refine the criterion in the next version of results. (cite \_author) has worked another way of calculating effective number of political parties.

<sup>5</sup>Both Lok Sabha and Vidhan Sabha elections.

Table 7.1: Estimated Random Voters in Lok Sabha and Vidhan Sabha Elections

Cross Sections	Pre NOTA	Post NOTA	Change
Lok Sabha	24,890	23,894	-995
Andhra Pradesh	6998	4007	-2991
Arunachal Pradesh	160	140	-20
Assam	4151	4998	846
Bihar	3910	3252	-657
Chhattisgarh	2868	3923	1054
Delhi	3406	5682	2275
Goa	434	838	403
Gujarat	1507	971	-536
Haryana	5692	5601	-90
Himachal Pradesh	1427	534	-892
Jammu & Kashmir	2432	2297	-134
Jharkhand	7233	-3634	-10867
Karnataka	5418	4459	-958
Kerala	722	4633	3910
Madhya Pradesh	4062	3392	-670
Maharashtra	6012	2104	-3907
Manipur	1217	1270	52
Meghalaya	1634	1743	109
Mizoram	1045	-2551	-3596
Nagaland	649	453	-195
Odisha	4706	5680	974
Puducherry	419	918	499
Punjab	2993	9003	6010
Rajasthan	4469	4907	438
Sikkim	22	-5	-28
Tamil Nadu	817	4062	3244
Telangana	6264	5634	-630
Tripura	40	66	25
Uttar_Pradesh	14615	14124	-490
Uttarakhand	3447	2223	-1223
West Bengal	1278	3496	2218
Overall <sup>5</sup>	6762	7492	730

## 8 Appendix C

This appendix gives some interesting insights from the data on Indian Elections.

### **The Curious Case of Maharashtra**

- Highest NOTA polled, ever: Latur Rural in Maharashtra State Elections, 2019, NOTA vote share: 13.78%. Turnout: 61.81%.
- NOTA won second position in Latur Rural constituency. Dhiraj Vilasrao Deshmukh of INC, son of ex-CM Vilasrao Deshmukh, won this election.
- NOTA won second position out of 10 candidates in Palus Kalegaon constituency in 2019 elections. With a turnout of 73.74%, NOTA had 9.99% vote share.
- Interestingly, in 2018 Maharashtra SEC decreed that if NOTA option got the maximum votes in an election, fresh elections will be held. The cases above are from 2019.

### **Highest NOTA ever**

- In general elections, highest NOTA vote share was polled in Gopalganj(SC), Bihar, 2019 and Bastar(SC), Chhatisgarh, 2014. NOTA vote share of 5.04% with a turnout of 55.78% and 59.31% respectively.
- In state elections, Latur Rural, Maharashtra had the highest NOTA vote share (see The Curious Case of Maharashtra in Appendix C for details).

### **Lowest NOTA ever**

- In general elections, Hisar (Haryana) features as the constituency polling lowest NOTA with 76.17% turnout and 0.14% vote share (2014).
- In State Electios, with a turnout of 90.23%, Mariyan Geku (Andhra Pradesh, 2014) received lowest NOTA of 0.08% with just 7 votes.

### **Consistent High NOTA Constituencies**

Few constituencies consistently feature in 95 percentile bracket of NOTA vote share percentage. Table 8.1 is the distribution of these constituencies by state. For instance, there are 32 constituencies in Chhatisgarh state elections that have been consistently voting high NOTA since it was introduced.

### **Consistent Low NOTA Constituencies**

In line with Table 8.1, Table 8.2 is the distribution of low NOTA constituencies by state. For instance, there are 10 constituencies in Haryana Vishan Sabha elections that have been consistently voting low NOTA since it was introduced. Low NOTA constituencies consistently feature in 5 percentile bracket of NOTA vote share percentage.

Table 8.1: Count of Constituencies with Consistent High NOTA Vote Share

States	Lok Sabha	Vidhan Sabha	Grand Total
Bihar	2		2
Chhattisgarh	2	32	34
Gujarat	2		2
Jharkhand		4	4
Madhya_Pradesh		24	24
Maharashtra		4	4
Odisha	4		4
Rajasthan		10	10

Table 8.2: Count of Constituencies with Consistent Low NOTA Vote Share

States	Lok Sabha	Vidhan Sabha	Grand Total
Delhi	2	2	4
Haryana	10	26	36
Karnataka	2		2
Lakshadweep	2		2
Madhya_Pradesh		2	2
Maharashtra	4	2	6
Manipur	2		2
Nagaland	2		2
Uttar_Pradesh	2		2