Appendix-I: The Tactical Distribution Hypothesis

The purpose of part one of our research is to investigate the factors which influence distribution of discretionary grants in India. In our study, discretionary grants include grants for central plan schemes, centrally sponsored schemes, and ADHOC grants. From the descriptive statistics for discretionary grants (Table 1), we observe significant heterogeneity among states and within states. Thus, it is more appropriate to use the panel data that will enable us to control for the state-specific effects and get more realistic and appropriate estimation of the factors contributing to the variations in grants.

Table 1: *Descriptive statistics: State-wise Discretionary Grants*

State	Statistics	Total grants **(Rs billion)**	**State**	Statistics	Total grants **(Rs billion)**
Andhra Pradesh	mean	11.33936	**Maharashtra**	mean	17.50172
	std. dev.	14.31991		std. dev.	31.34819
	minimum	0.1767		minimum	0.2241
	maximum	52.9108		maximum	179.6663
Bihar	mean	7.787756	**Orissa**	mean	6.931993
	std. dev.	9.433736		std. dev.	8.632789
	minimum	0		minimum	0.1132
	maximum	32.3254		maximum	31.7254
Gujarat	mean	5.60487	**Punjab**	mean	3.904574
	std. dev.	7.507038		std. dev.	5.815311
	minimum	0		minimum	0
	maximum	30.5359		maximum	19.031
Haryana	mean	4.056542	**Rajasthan**	mean	7.8745
	std. dev.	6.378082		std. dev.	8.154147
	minimum	0		minimum	0
	maximum	28.1405		maximum	27.2749
Karnataka	mean	11.78425	**Tamil Nadu**	mean	8.893121
	std. dev.	17.00614		std. dev.	11.12277
	minimum	0.1178		minimum	0
	maximum	54.0043		maximum	36.632
Kerala	mean	4.393788	**Uttar Pradesh**	mean	19.28245
	std. dev.	7.143362		std. dev.	35.52006
	minimum	0.0744		minimum	0
	maximum	42.5935		maximum	196.2368
Madhya Pradesh	mean	10.07081	**West Bengal**	mean	8.816735
	std. dev.	13.49004		std. dev.	14.8011
	minimum	0.2093		minimum	0.1067
	maximum	61.3906		maximum	57.3805

In official communications, the government of India asserts that grants given for centrally sponsored schemes and central plan schemes (discretionary grants) are directed at the most backward areas with the sole purpose of rural development and poverty alleviation. Therefore, people and areas with low income benefit from these grants. However, in our data we find that this is not the case. To get an idea about the relationship between grant distribution and income level we examined scatter plots for the pre- and post-reform periods (Figures 1 and 2). We found that the reverse of the official claim is true. Rather than directing grants to the states that need more money, the government channels more grants to the states which already have a high per capita income.

Figure 1: Relationship between grants and income (Pre-Reform period)

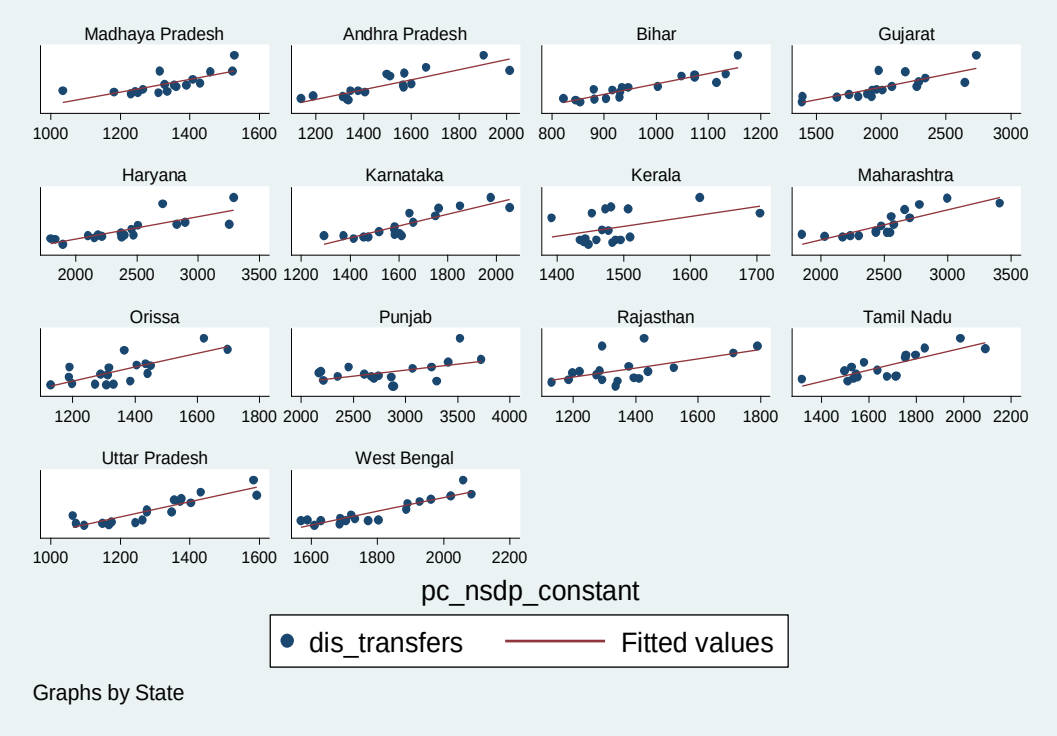
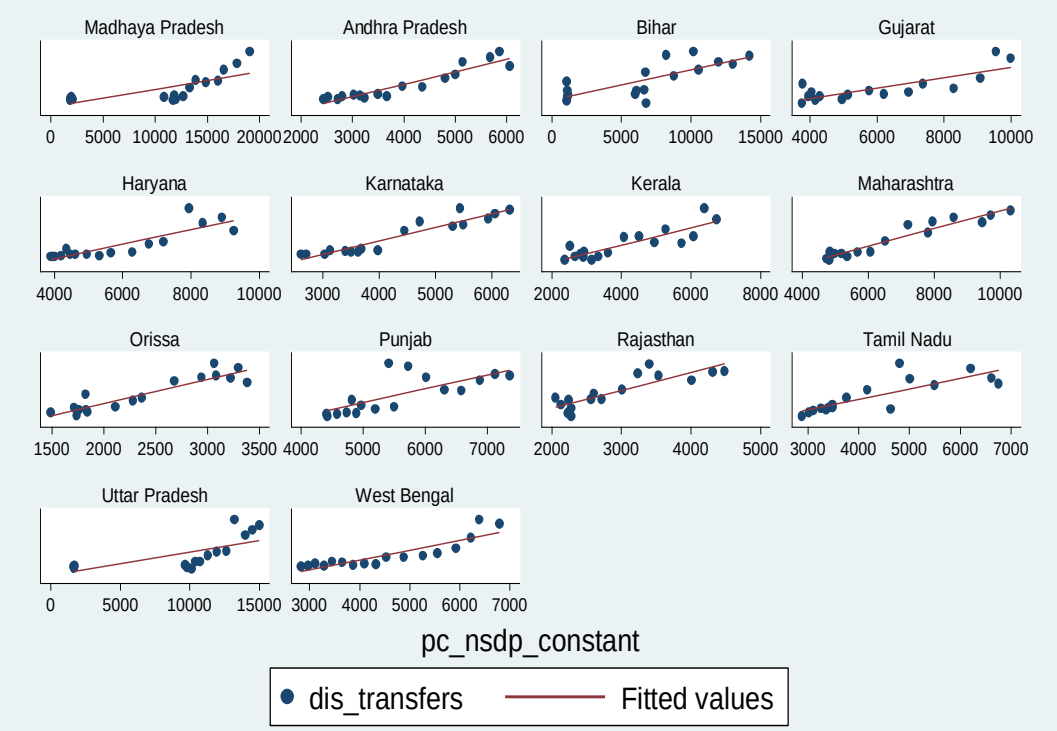


Figure 2: Relationship between grants and income (Post-Reform period)



To explain the variations in total grants we created a dummy variable for the partisanship of Chief Ministers (CMs) in the 14 major states, which takes the value of 1 if the CM is affiliated to the PM's party and 0 otherwise. We controlled for several variables known to influence distribution of grants.

(i) *The log of per-capita net state domestic product in constant prices .* The significance of this variable is that, on the one hand, equity concerns can lead government to direct more funds to low-income states than high-income states, and, on the other hand, the higher lobbying power of high-income states can enable them to extract preferential treatment from the central government. The effects may interact with each other, leading to progressive distribution, regressive distribution, or no significant impact, depending on the politics of the period.

(ii) *The log of state populations residing in rural areas*. We expect more funds to be directed to rural constituencies because most of the discretionary transfers are actually given in the name of rural development. In addition, various election studies have found that rural constituencies in India generally outvote urban constituencies by a significant percentage. Thus, pragmatically, the larger the rural population, the higher the number of voters that can be expected to turn out to vote.

(iii) *Life expectancy and Literacy rate*. These variables are considered important indicators of quality of life and human development. A low value would indicate the low human-development capacity of a state government and the consequent need to expand services in social sectors. These concerns can lead states with low life expectancy to receive more grants. On the other hand, a high value would indicate a higher level of education, implying more political awareness. High values also indicate higher well-being and hence greater ability to participate in politics. Such factors can lead states with better education and health indicators to receive preferential treatment.

(iv) *Percentage of voter turnout in the most recent parliament election*. This variable proxies voter consciousness in a state. As already argued, the degree to which the electorate participates in elections and is informed about policies can influence central grant awards.

The key explanatory variable in this part of the research is partisanship of the CM. During the pre-reform era (1972-89), for most of the period, there were only two categories of CMs—either affiliated or opposition. In the second period (1991-2014), there were four categories: (a) CMs belonging to the PM's party (b) CMs belonging to a coalition partner party (c) CMs belonging to a party which provided outside support to the national ruling coalition. (d) CMs belonging to an opposition party. For the sake of consistency and comparison we club all the categories of CMs except those belonging to the PM's party as non-affiliated for the second period (1991-2014).

Table 2: *Chief Minister's affiliation Pre and Post-1991 Period*

1971-1989				**1991-2013**			
CM	Freq.	Percent	Cum.	CM	Freq.	Percent	Cum.
CM_{affil}	162	69.3	69.3	CM_{affil}	55	23.50	23.50
CM_{opp}	71	29.97	100	CM_{align}	26	11.11	34.62
				CM_{opp}	115	49.15	83.76
				CM_{osp}	38	16.24	100

Before undertaking the regression analysis, we checked the data for stationarity, by employing the Levin-Lin-Chu unit-root test. The test results for the two periods, summarized in Table 3, indicate that in almost all cases we can reject the null hypothesis of the existence of unit root. Thus, our time series is stationary and we can use the chosen variables for empirical research.

Table 3. *Levin-Lin-Chu unit-root test with trend*
Ho: There is unit root and the variables are not stationary

		UNADJUSTED T	**ADJUSTED T***	**P-VALUE**
1972-1989				
	Discretionary Grants	-12.47	-5.49	0.00
	Net State Domestic Product	-11.25	-2.59	0.00
	Rural Population	-3.85	-1.97	0.02
	Voter Turnout	-8.84	-3.35	0.00
	Life Expectancy	-10.26	-4.75	0.00
	CMaffil	-12.02	-6.21	0.00
		Unadjusted t	**Adjusted t***	**p-value**
1991-2014				
	Discretionary Grants	-9.90	-3.11	0.00
	Net State Domestic Product	-7.26	-2.56	0.01
	Rural Population	-7.20	-3.19	0.00

	Voter Turnout	-22.94	-18.33	0.00
	Life Expectancy	-12.91	-7.59	0.00
	CMaffil	-14.44	-8.54	0.00

In order to select the perfect model—fixed effect versus random effect—we performed a Hausman specification test. The results for the given models for two periods are summarized in Table 4, below. The null hypothesis is that differences in coefficients are not systematic. If the null hypothesis is not rejected, it is advisable to use a random effects model. From the test results we can see that in most cases we can reject the null hypothesis. Thus, we decided to use fixed effects model.

Table 4: Hausman specification test
Ho: *Difference in coefficients not systematic*

1972-1989	
H_0: $unit\ root$	Per Capita Discretionary Grants
chi2	29.37
Prob>chi2	0.0003
1991-2014	
chi2	25.97
Prob>chi2	0.0021

We then employed a *Modified Wald test* for group-wise heteroskedasticity and a *Wooldridge test* for autocorrelation in panel data. The test results are summarized in Tables 5 and 6. From Table 5 we can see that the null hypothesis is rejected, which means that heteroskedasticity exists in our model for both periods. From Table 6, we reject the null hypothesis, which means that autocorrelation exists, especially for period 1.

Table 5 *Modified Wald test for group-wise heteroskedasticity*

H_0: $sigma(i)^2 = sigma^2\ for\ all\ i$	**Per Capita Discretionary Grants**
1972-89	
chi2	118.93
Prob>chi2	0
1991-2014	
chi2	2114.06
Prob>chi2	0

Table 6 Wooldridge test for autocorrelation in panel data

H_0: $no\ first-order\ autocorrelation$	**Per Capita Discretionary Grants**
1972-89	
F	22.064
Prob>F	0.0004
1991-2014	

F	2.142
Prob>F	0.1671

Since we have heteroskedasticity and autocorrelation problems, we use autocorrelation and heteroskedasticity robust models. Thus we run command for robust variance-covariance estimate for dealing with suspected heteroskedasticity and within panel autocorrelation in the idiosyncratic error term.

In short, we use a fixed-effect estimator and employ White's heteroscedasticity and autocorrelation consistent standard errors. The choice of model is based on the results of Hausman specification, modified Wald (group-wise heteroscedasticity) and Wooldridge (autocorrelation in panel data) tests. The general functional form of the models for the pre-and post-reform period can be presented as:

$$Grant_{it} = C_i + \beta_1 Inc_{it} + \beta_2 Controls_{it} + \beta_3 Exp_{var_{it}} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots (1)$$

In equation 1, $Grant_{it}$ is the grants value for i_{th} state during the period t; Inc_{it} is the per capita net state domestic product of i_{th} state during the t_{th} period of time; $Controls_{it}$ represent the control variables and $Exp_{var_{it}}$ are the key explanatory (Independent) variables; $\beta_1, \beta_2, and\ \beta_3$ are corresponding coefficients of the given variables; $C_i$represents the state-specific individual effects; and ε_{it} is the error term. We also introduce period dummies as we attempt to obtain results distinctive to the two-time periods, i.e., the period between 1972 and 1989 (command economy) and the post-reform period (market economy after 1991).

Appendix-II: The Economic Governance Hypothesis

Part 2 of our research investigates the impact of economic governance on performance of national incumbents in national elections and state incumbents in state assembly elections in India. Figure 1(a) and (b) illustrate the relationship between the two variables in national elections. The graphs show a statistically significant high positive correlation between these two variables. Thus, based on the observed data and the existing theories on the relationship between the economic and electoral performance, our research aims to test this hypothesis.

Figure 1(a) – Impact of GDP growth performance on seat share of national incumbents (1952-2014)

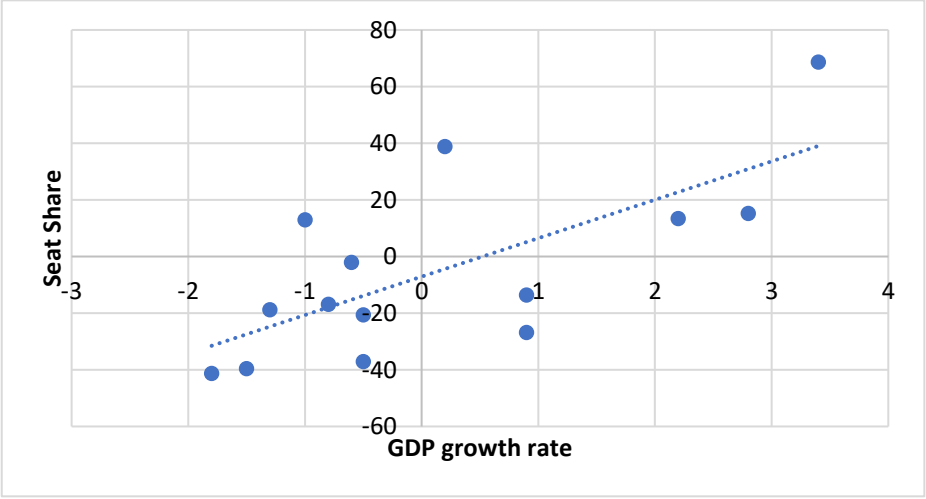
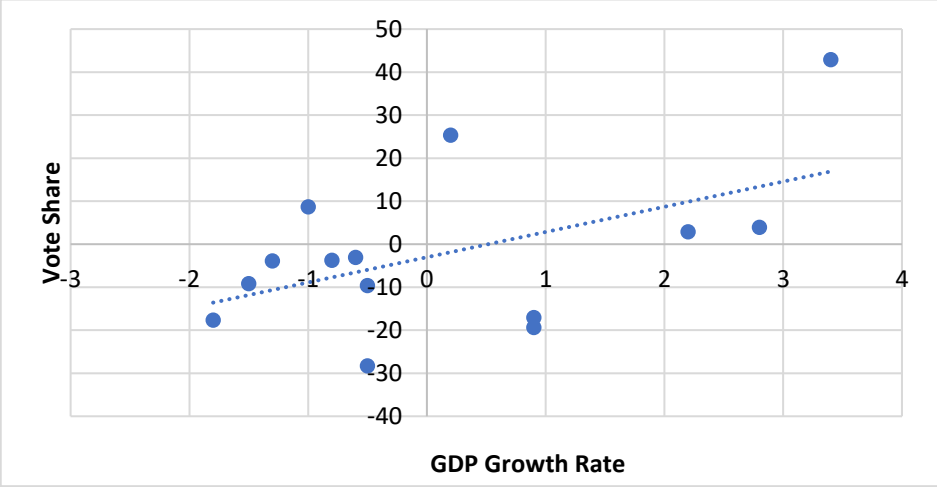


Figure 1(b) – Impact of GDP growth performance on vote share of national incumbents (1952-2014)



This research undertakes empirical analysis for the period 1972-2014, using the data of 14 major states of India which account for 95 per cent of the national population. In November 2000, the boundaries of three states (Bihar, Madhya Pradesh and Uttar Pradesh) were redrawn, and a new state was carved out of each of them. So, after 2000, population, income, grants, assembly seats, and parliamentary constituencies are calculated for truncated Bihar, Madhya Pradesh and Uttar Pradesh. Table 1 illustrates the national and subnational elections considered in our empirical analysis.

Table 1: National and Subnational Elections: 1971-2014

	State elections								
National	Andhra Pradesh	Bihar	Gujarat	Haryana	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa
1971-1977	1972-1978	1972-1977	1972-1975	1972-1977	1972-1978	1977-1980	1972-1977	1972-1978	1971
--	---	---	---	---	---	---	---	---	1974
1977-1979	1978-1982	1977-1980	1975-1980	1977-1982	1978-1983		1977-1980	1978-1980	1977
1980-1984	1983-1985	1980-1985	1980-1985	1982-1987	1983-1985	1980-1982	1980-1985	1980-1985	1980
---	---	---	---	---	---	1982-1987	---	---	-
1985-1989	1985-1989	1985-1990	1985-1990	1987-1991	1985-1989	1987-1991	1985-1990	1986-1990	1985
1990-1991	1989-1994	1990-1995	1990-1995	---	1989-1994	---	1990-1993	1990-1995	1990
1991-1996	--	---	---	1991-1996	----	1991-1996	1994-1998	---	-
1996-1997	1995-1999	1995-2000	1995-1998	1996-2000	1994-1999	1996-2001	---	1995-1999	1995
1998-1999	--	---	1998-2002	---	----	---	---	---	-
1999-2004	1999-2004	2000-2005	2002-2007	2000-2005	1999-2004	2001-2006	1999-2003	1999-2004	2000
2004-2009	2004-2009	2005-2010	2007-2012	2005-2009	2004-2008	2006-2011	2004-2008	2004-2009	2004
2009-2014	2009-2014	2010-2015	2012-2017	2009-2014	2008-2013	2011-16	2009-2013	2009-2014	2009
2014-2019	2014-2019	2015-2020	2017-	2014-2019	2013-2018	2016-	2013-2018	2014-2019	2014

We employed two types of models with two different outcome variables to measure elections results. In the first group of models we used a continuous variable, percentage seats won by the governing party; and in the second group of models we used a dummy variable, describing whether the governing parties at the national and subnational level were re-elected. Figures 2-6 illustrate certain trends with regard to the dependent variables for national and state assembly elections.

Figure 2 displays state-wise performance of the PM's party seeking re-election. We observe that, overall, national election results in all states follow a similar path: high support for the incumbent PM's party until the elections of 1990—except in 1977 and 1980—and low support thereafter, with an upward spike in 2009.

Figure 2- % of MP seats won by the national incumbent party seeking re-election

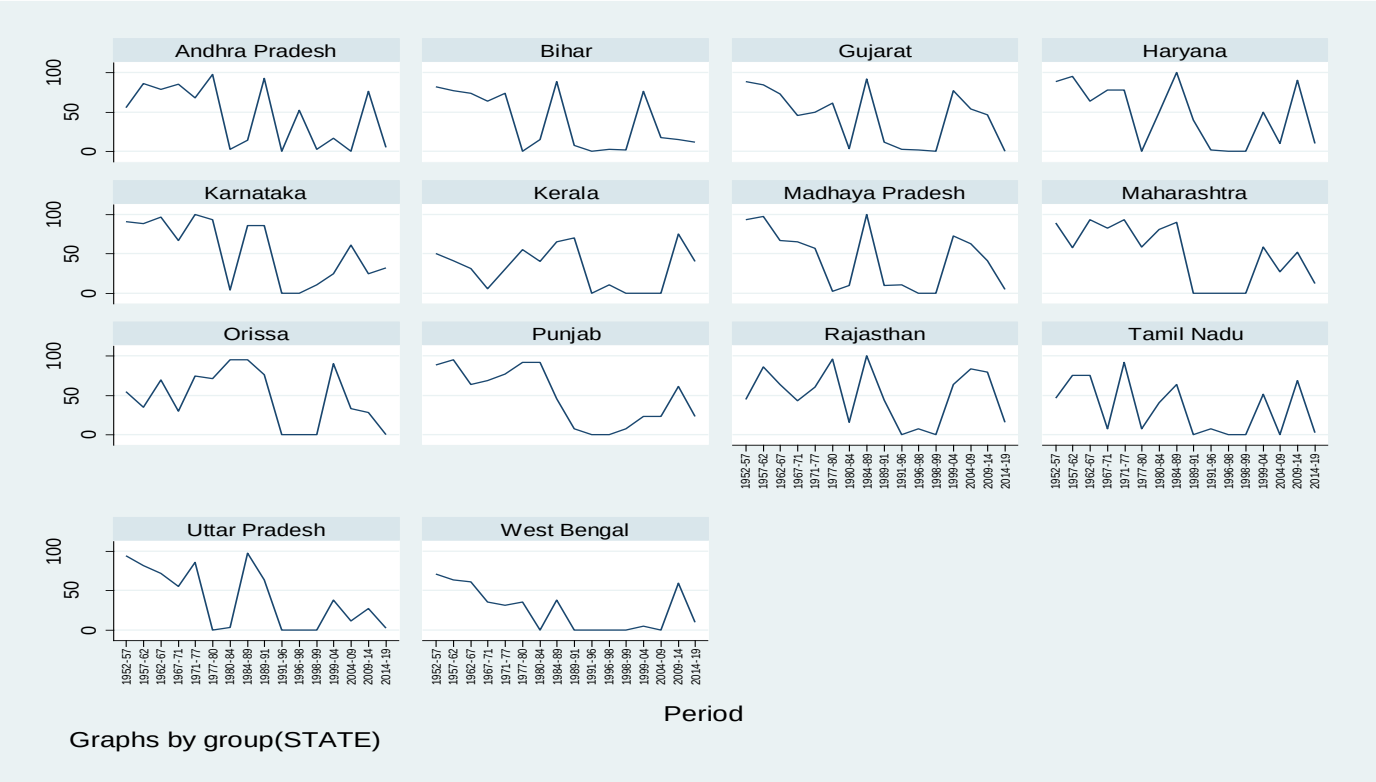


Figure 3 illustrates the number of states during each election supporting the national incumbent seeking re-election.

Figure 3: States' support to the national incumbent seeking re-election

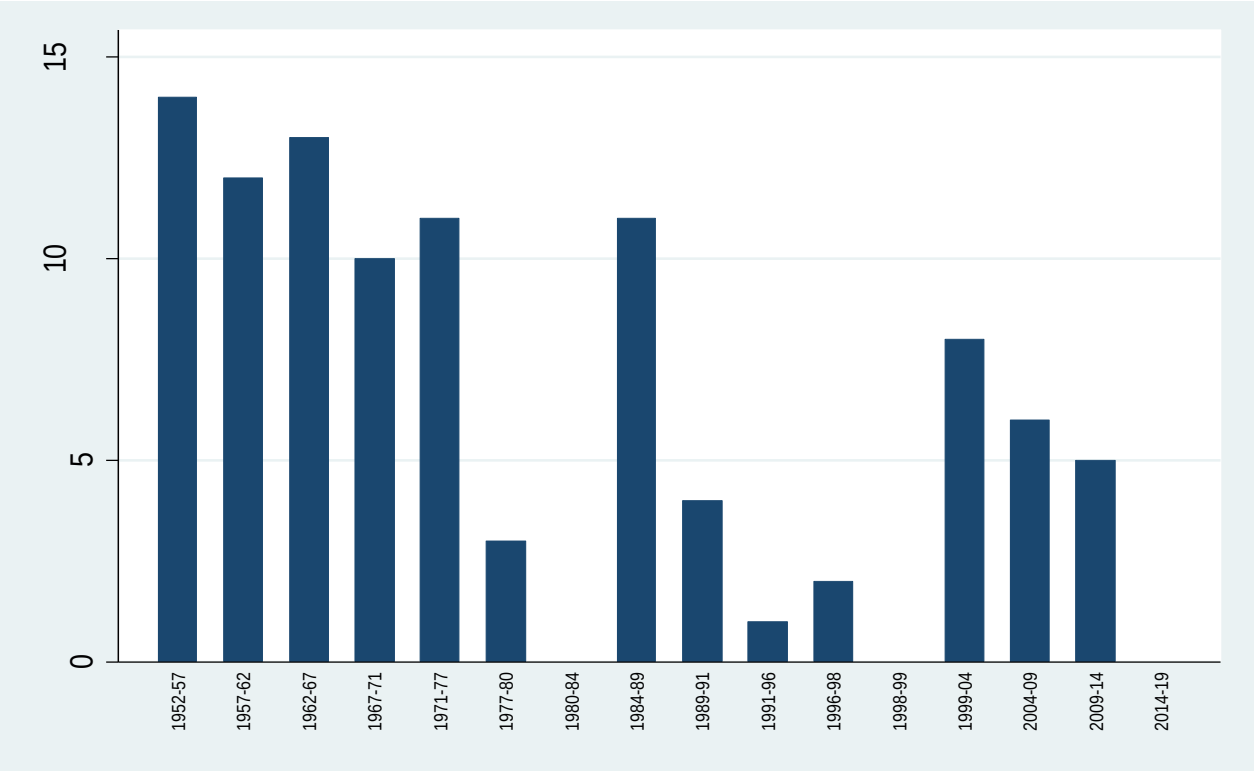


Figure 4 shows the number of states where the election outcomes were the same at the national level and the subnational level. We observe that when ten or more 'major states' support the same party in national elections, the state level effects aggregate to produce a one-party majority at the national level. Otherwise, no single party can obtain a majority in the Lok Sabha. This situation can be observed from 1989 onwards. In 2014, the BJP formed a majority government despite not fulfilling this criterion because the party could win a whopping 208 Lok Sabha seats in just eight states.

Figure 4: Number of states where the party winning the highest number of parliamentary seats is thesame as the party that forms government at the Centre

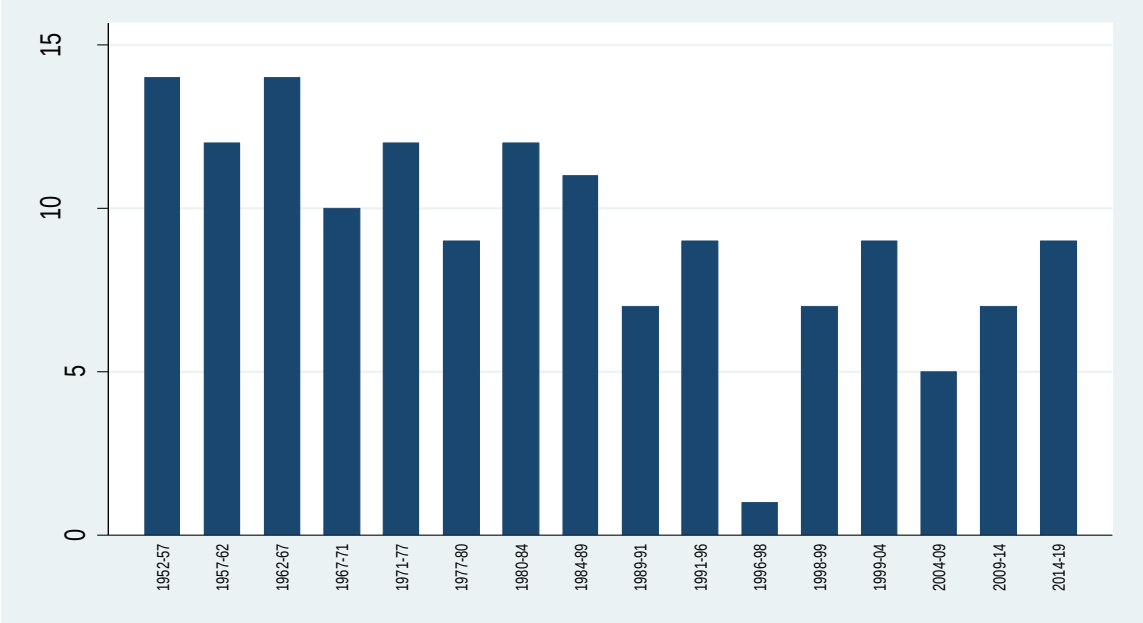
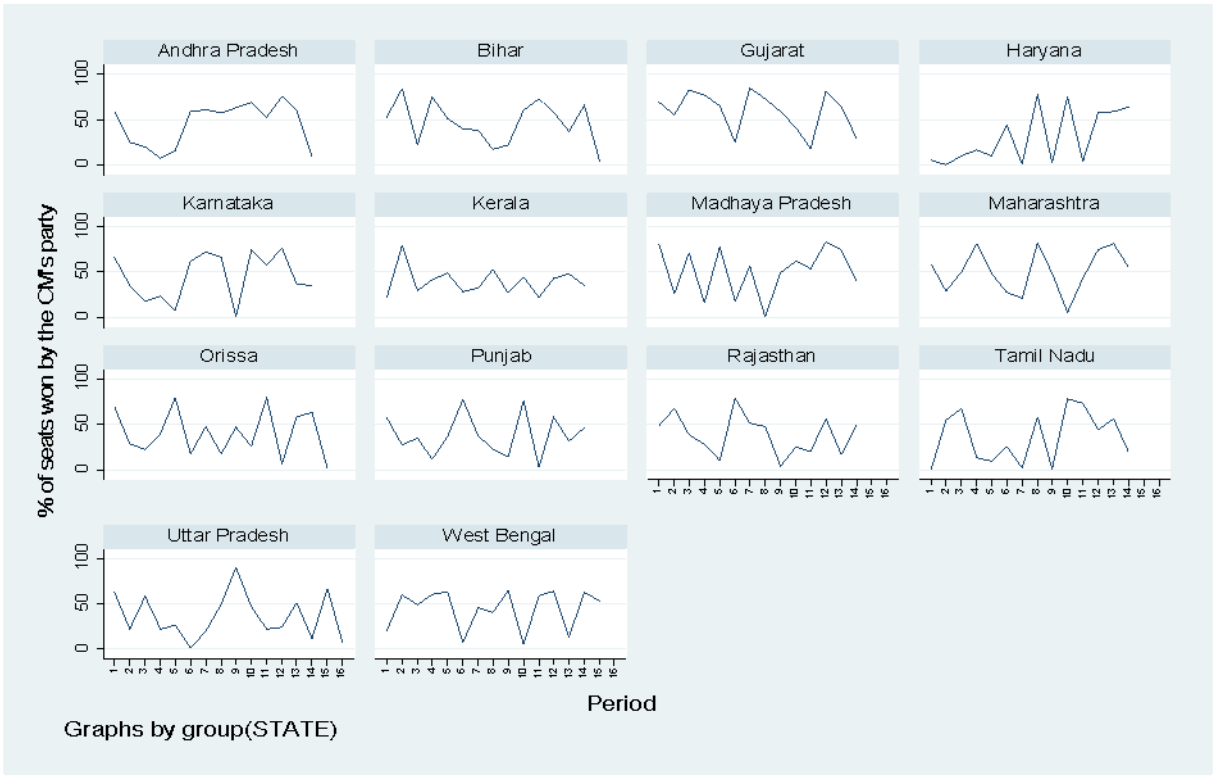


Figure 5 shows % of seats won by the previous state incumbent. We observe that there is no obvious common path observed across states and that developments are unique to each state.

Figure 5: % of seats won by the incumbent CM's party (seeking re-election)



From figure 6 we can observe that anti-incumbency is highest in Kerala followed by Punjab while pro-incumbency is highest in Gujarat and West Bengal.

Figure 6: State-wise performance of incumbent parties

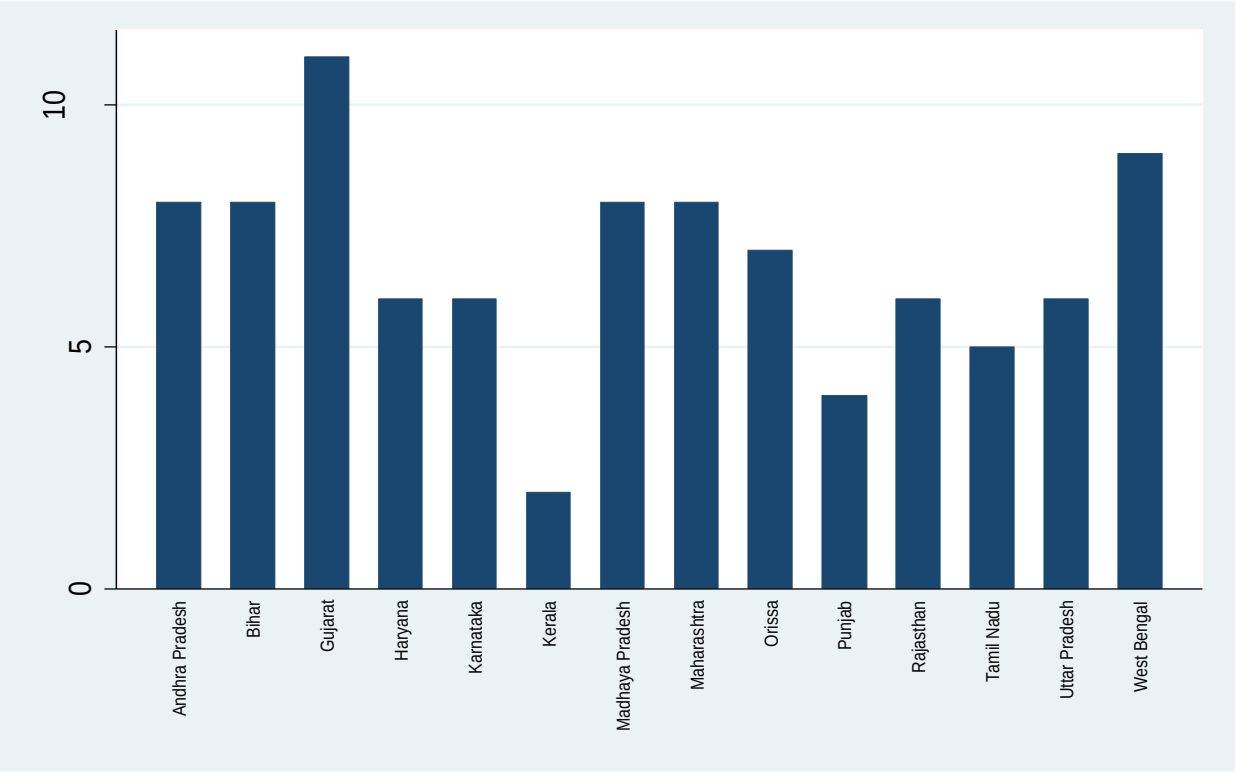


Table 2 (a) and (b) shows the extent to which the state level effects aggregated to the national level in the pre- and post-reform periods. Until 1989 we notice that the party that is successful in most of the states (60% of election results from 14 states between 1972-89) forms government at the centre as well. This shows homogenous aggregation of the state-level effects. However, after 1991 no single party could dominate the national elections in all the states. The Congress Party. which governed India for three full terms, either alone (1991-96) or with allies (2004-2013), could win only 28.5% of the elections in 14 states between 1991-2013.

The political landscape during the post-1991 period presents a contrast to the preceding period in three senses—(a) The state-based parties were more successful than national parties in forming state governments, with the result that at a given moment the vast majority of states were ruled by the parties, or coalitions, not affiliated with the party at the centre. The dataset used in this study indicates that during this period only 24% of state governments shared the PM's party affiliation. (b) The state-based parties during the post-reform period, won, on an average, 35 to 45% of parliamentary seats, as compared to 5-7% during the pre-reform era. (c) the majority of parliamentary constituencies in more than half of the states were held by MPs who did not represent the party of the Prime Minister implying that the latter could not

form a majority government at the centre on its own. Thus, the national parties seeking to form governing coalitions had to bargain with state parties.

Table 2 (a) *Lok Sabha elections in 14 states: Pre and Post 1991*

Party winning Highest Lok Sabha Seats in Parliament (PM's Party)											
	1971-1989			**1991-2013**				**1991-2014**			
Party/Alliance	Freq.	Percent	Cum.	Party/Alliance	Freq.	Percent	Cum.	Party/Alliance	Freq.	Percent	Cum.
				BJP/NDA	28	33.33	33.33	BJP/NDA	42	42.86	42.86
Congress	42	60	60	Congress/UPA	42	50	83.33	Congress/UPA	42	42.86	85.71
Janata/NF	28	40	100	Third Front	14	16.67	100	Third Front	14	14.29	100
Total	70	100		Total	84	100		Total	98	100	
Party Winning highest Lok Sabha constituencies in specific states (MPs' Party)											
Party/Alliance	Freq.	Percent	Cum.	Party	Freq.	Percent	Cum.	Party	Freq.	Percent	Cum.
BJP	2	2.86	2.86	BJP	33	39.29	39.29	BJP	42	42.86	42.86
Congress	42	60	62.86	Congress	24	28.57	67.86	Congress	24	24.49	67.35
State Parties	13	18.57	81.43	State Parties	25	29.76	97.62	State Parties	30	30.61	97.96
Janata/NF	13	18.57	100	Third Front	2	2.38	100	Third Front	2	2.04	100
Total	70	100		Total	84	100		Total	98	100	

Table 2 (b)

Parliamentary election results at the state level *versus* **the aggregate result at the national level: Same or different?**												
Period	**1971-2014**			**1971-89**			**1991-2013**			**1991-2014**		
Statistics	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Same	148	66.07	66.07	51	72.86	72.86	38	45.24	45.24	47	47.96	47.96
Different	76	33.93	100	19	27.14	100	46	54.76	100	51	52.04	100
Total	224	100		70	100		84	100		98	100	

In the empirical models we hypothesize that, in addition to economic performance, measured by the real net state domestic product, voters' behaviour is influenced by the financial allocations to the states during the incumbent party's term in office. Since rapid growth of the economy in a developing country like India can lead to a highly unequal distribution of resources and hence political unrest and social discontent, we control for human development indicators such as life expectancy and literacy rates. We also control for urbanization, which is known to have substantial poverty-reduction effects. In the context of India, it has been found that urban consumption growth brought gains to the rural as well as the urban poor[1].

The descriptive statistics are presented in the Table 3, below.

1 Gaurav Datt, Martin Ravallion, and Rinku Murgai, 'Growth, Urbanization and Poverty Reduction in India', Working Paper (National Bureau of Economic Research, February 2016), https://doi.org/10.3386/w21983.

Table 3: Descriptive Statistics

State	*Statistic*	*pc_rNSDP (rupees)*	*Grants (mln rupees)*	*Rural population (mln.)*	*Deficit (mln. rupees)*	*Life expectancy (%)*	*Literacy (%)*
Andhra Pradesh	Mean	15632	9310.0	47.6	n.a.	61.6%	46.0%
	St. dev	7715	11800.0	7.0	n.a.	3.8%	12.8%
Bihar	Mean	4846	4690.0	73.6	-912.1	59.6%	39.2%
	St. dev	2091	5720.0	13.3	14742.7	5.2%	9.8%
Gujarat	Mean	19663	3330.0	27.2	-15657.4	62.1%	58.0%

	St. dev	9553	3070.0	4.5	21310.1	4.0%	12.5%
Haryana	Mean	23916	3390.0	12.4	-6826.4	63.3%	52.5%
	St. dev	10262	6160.0	2.5	11409.6	3.5%	15.7%
Karnataka	Mean	16994	8220.0	30.5	-627.6	63.0%	55.9%
	St. dev	8091	13600.0	4.6	10515.0	3.6%	11.1%
Kerala	Mean	19402	2540.0	20.9	-14708.7	70.6%	85.3%
	St. dev	9359	2010.0	1.6	16584.5	3.8%	7.6%
Madhya Pradesh	Mean	8090	6910.0	47.9	1034.0	56.3%	48.2%
	St. dev	4403	6250.0	7.5	20786.9	4.1%	12.8%
Maharashtra	Mean	23199	10400.0	48.1	-24507.1	64.9%	65.4%
	St. dev	10911	14700.0	7.9	33028.2	3.8%	10.8%
Orissa	Mean	12741	6410.0	27.3	-3987.3	57.3%	48.4%
	St. dev	3825	7900.0	4.3	10146.4	4.2%	14.4%
Punjab	Mean	24709	2500.0	14.0	-14721.4	66.1%	56.4%
	St. dev	7693	2980.0	2.1	15776.9	3.3%	13.1%
Rajasthan	Mean	13114	6520.0	34.8	-12171.1	60.4%	42.7%
	St. dev	4531	6200.0	8.7	15924.1	4.5%	13.9%
Tamil Nadu	Mean	18976	6590.0	34.3	-12943.8	63.3%	63.0%

	St. dev	9452	6930.0	2.5	14967.8	4.4%	10.2%
Uttar Pradesh	Mean	6585	13800.0	113.0	-17940.8	56.5%	43.3%
	St. dev	3641	22100.0	23.0	40504.8	5.3%	12.5%
West Bengal	Mean	14601	5350.0	48.6	-43384.7	62.5%	57.8%
	St. dev	5704	6520.0	8.9	58611.3	5.1%	10.9%
Total	Mean	15891	6430.0	41.4	-12873.4	62.0%	54.4%
	St. dev	9432	9900.0	26.7	27186.7	5.5%	16.4%

The Model

We have panel data of 14 states for both national and state assembly elections from 1972 to 2014. In order to capture behavioural differences between individual states, referred to as individual heterogeneity between the states, we controlled for individual specific effects and employed models with the following general functional form:

$$Election_{it} = \alpha_i + \beta\ pcRNSDP_{it-1} + \beta\ pcGRANTS_{it-1} + \gamma Control_{it-1} + e_{it} \quad (1)$$

$Election_{it}$ in the first group of models is a continuous variable indicating % of seats won by the previous incumbent party for i_{th} state and t_{th} period, and in the second group of models is a dummy variable indicating whether the previous incumbent party was re-elected for i_{th} state and t_{th} period. $pcRNSDP_{it-1}$ is the previous period's growth rate of real per capita net state domestic product in the i_{th} state. $Control_{it-1}$ are the control variables, including the previous period's growth of rural population, growth of government budget deficit, changes in life expectancy and literacy rates for the i_{th} state. α_i is the individual specific constant term, $\beta\ and\ \gamma$ are the respective marginal effects, and e_{it} is the error term for i_{th} state and t_{th} period.

In the first group of models, where the dependent variable is continuous, we control for individual specific effects (individual heterogeneity) by employing both fixed effects and random effects models. In a fixed effects model individual differences are fixed over time and are captured by the different individual specific, time invariant intercepts of the model. The functional form of a simple fixed effects model can be presented as;

$$Y_{it} = \beta_{0i} + \beta_1 X_{it} + \varepsilon_{it} \quad (2)$$

Random effects model also assume individual heterogeneity, but it is treated as a random effect because of randomly selected individuals. Thus, a simple random effects model can be presented as;

$$Y_{it} = \overline{\beta_0} + \beta_1 X_{it} + \nu_{it} \quad (3)$$

$$\nu_{it} = u_i + \varepsilon_{it} \quad (4)$$

Where, $\overline{\beta_0}$ is the population average of the intercept, and u_i is the random individual difference of the intercept from the population average.

Fixed effects models are used when we assume that individual specific error term and the constant are not correlated with each other. In these models we include the time invariant individual effects in the individual specific constant terms. In the random effects models, we assume random variation across individuals and include individual specific effects in the error terms. Furthermore, as we observed problems of group wise heteroskedasticity in the idiosyncratic errors of a linear panel-data model (variance in the model was not constant), we estimated panel-data models by using feasible generalized least squares, which solves the problems of heteroskedasticity across the panels.

In the second group of models, where the dependent variable was binary, we employed logit/probit models with fixed effects, random effects, and population average. As the dependent variable in these models is binary and takes only two values (either 0 or 1), its expected values are interpreted as probabilities.

$$E(Y_{it}) = Pr\,(Y_{it} = 1) \quad (5)$$

We take into consideration the main problems of linear probability models (estimated probabilities not being in the reasonable range (0, 1) and linearity not being a rational assumption). In the logit models we assumed a logistic distribution (equation 6) and in the probit models we assumed standard normal distribution (equation 7);

$$G(X_{it}\beta) = \frac{exp(x_{it}\beta)}{1+exp(x_{it}\beta)} \quad (6)$$

$$\Phi(X_{it}\beta) = \int_{-\infty}^{X_{it}\beta} \psi(v)dv \quad (7)$$

The Estimation Tests

Prior to the empirical estimation of the models, several pre-estimation tests were employed to choose the correct model specifications. The first obvious question which arises while dealing with panel data analyses is whether there is heterogeneity in the data which should be controlled, or whether the panel data should be pooled and the estimation done by using a pooled regression approach. Furthermore, it is crucial to test whether the random effect or the fixed effect model is more preferred. We did this by employing the Hausman specification test. The test basically checks for any correlation between the error components and the regressors in a random effects model. The null hypothesis in the Hausman specification test is that the random effects estimator is an efficient and consistent estimator of the true parameters. If this is the case, there should be no systematic difference between the two estimators and the random effects model is preferable. Otherwise, if there exists a systematic difference in the estimates, and the assumption of efficiency is violated, then one should employ the fixed effects model.

The test results, summarized in Table 4, indicate that in all cases we could not reject the null hypothesis, hence the random effects model was preferred. However, a potential problem when using random effects estimation can be the endogeneity problems arising from the fact that the random error term is correlated with any of the explanatory variables. This problem is common in random effects models. However, for our models it is not the case, as our right hand side variables are in the lag terms.

Table 4: *Hausman specification test*

	Continuous dependent		**Logit**	
	National level	**State level**	**National level**	**State level**
chi2	2.64	0.52	0.97	5.01
Prob. >chi2	0.8529	0.9975	0.9866	0.5431
Decision	Random effects	Random effects	Random effects	Random effects

For the Probit models the test was not applicable as only random effects models are available for Probit models

H_0: Difference in coefficients not systematic, and the random effects model should be chosen

In the next test we checked for the existence of autocorrelation and heteroskedasticity in the models, through the Wooldridge test for autocorrelation and a modified Wald test for group-wise heteroskedasticity.

The results, summarized in the Tables 5 and 6, show that in the models we have the problem of heteroskedasticity. To resolve this problem, we employed feasible generalized least squares (GLS) models, assuming that the error terms across the panels are heteroskedastic but uncorrelated.

Table 5: Wooldridge test for autocorrelation in panel data

	Continuous dependent	
	National level	**State level**
chi2	3.573	1.791
Prob. >chi2	0.0831	0.2056
Autocorrelation	No	No

For the Panel Logit and Probit models the test was not available

H_0: No first-order autocorrelation

Table 6: Modified Wald test for group wise heteroskedasticity

	Continuous dependent	
	National level	**State level**
chi2	61.33	2598.82
Prob. >chi2	0.0000	0.0000
Autocorrelation	Yes	Yes

For the Panel Logit and Probit models the test was not available

$H_0: \sigma_i^2 = \sigma^2 \ \ for\ all\ i$

To summarize, we tested the influence of economic governance indicators on electoral outcomes by using random effect models. The choice of model was based on the results of a Hausman test which revealed that the difference in coefficients was not systematic. Since our aim is to predict electoral outcomes based on knowledge of what happened during an incumbent's term in office, we include lagged values of our independent variables. This solves the problems of autocorrelation and endogeneity. However, as we observed problems of group-wise heteroskedasticity in the idiosyncratic errors of a linear panel-data model (variance in the model was not constant), we estimated panel-data models by using feasible generalized least squares (GLS), which addresses issues of heteroskedasticity across the panels. The general functional form of the models for the pre- and post-reform periods can be presented as:

$$Election_{it} = \alpha_i + \beta_1 Econ_{growth_{it-1}} + \beta_2 Econ_{patronage_{it-1}} + \beta_3 URBAN_{it-1} + \beta_4 DEV_{hd_{it-1}} + \beta_5 DEF_{revenue_{it-1}} + e_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

whereby $Election_{it}$ is a continuous variable indicating the percentage of seats won by the incumbent party for i_{th} state and t_{th} period, $Econ_{growth}$ is the growth rate of real per capita net state domestic product in the i_{th} state during the incumbent's term in office. $Econ_{patronage}$ is the growth rate of aggregate discretionary grants; $URBAN$ measures the pace of urbanization by calculating the decline in the growth rate of the rural population, DEV_{hd} represents changes in the life expectancy and literacy rates and $DEF_{revenue}$ is the growth rate of revenue deficit for the i_{th} state during the incumbent's term in office; α_i is the individual specific constant term, β_{1-5} are the respective marginal effects, and e_{it} is the error term for i_{th} state and t_{th} period.

The Empirical Estimation Results (for the entire period)

The results of all the empirical models are summarized in Tables 7 and 8. We also report the results of all models to facilitate comparison and check the robustness of the estimated coefficients.

Table 7: Empirical estimation results of continuous outcome models (1952-2014)

	National level elections			State level elections		
	Fixed effects	**Random effects**	**GLS**	**Fixed effects**	**Random effects**	**GLS**
NSDP	1.374**	1.238**	1.468***	1.317***	1.304***	1.452***
	(2.14)	(2.11)	(2.66)	(2.86)	(3.25)	(3.65)
Grants	-0.073	-0.069	-0.064	0.007*	0.007**	0.007***
	(-0.89)	(-0.92)	(-0.92)	(1.87)	(2.33)	(2.85)
Rural population	-19.221**	-11.045**	-12.782**	-3.892	-2.056	-3.053
	(-2.41)	(-2.05)	(-2.32)	(-0.62)	(-0.50)	(-0.99)
Deficit	0.000	0.000	0.000	-0.003	-0.002	-0.004
	(-0.19)	(0.01)	(0.15)	(-0.44)	(-0.34)	(-0.66)
Life expectancy	10.966	7.994	0.782	4.028	3.513	0.254
	(1.23)	(0.98)	(0.12)	(0.55)	(0.54)	(0.06)
Literacy	2.408	4.572	6.207	4.191	5.412	7.463
	(0.25)	(0.54)	(0.79)	(0.46)	(0.68)	(1.23)
Constant	0.16	0.029	0.077	-0.05	-0.087	-0.073
	(0.99)	(0.24)	(0.65)	(-0.38)	(-0.87)	(-0.98)

R-sqr	0.0876	0.0935	-	0.1432	0.1465	-
Obs.	116	116	116	101	101	101
F-stat/ Wald chi2	2.16	11.24	16.16	2.31	16.14	22.33

t-stat/z-stat are given in the parenthesis
*p<0.1, **p<0.05, ***p<0.01
All the independent variables are in the first lags. The dependent variable is the change in % of seats won in the elections. NSDP is per capita real NSDP growth rate (y/y), Grants is the growth rate (y/y) of total discretionary grants, Rural population is the growth rate of the rural population, Deficit is the growth rate (y/y) of the states` budget deficit, Life expectancy is the change (y/y) in the life expectancy rate, Literacy is the change (y/y) in the literacy rate.

Based on the empirical results for the entire period (1952-2014) we can state that if the economic growth rate increased by 1% during the incumbent's term in office, then the ruling party could expect approximately 1.5% increase in seats in the elections held at the end of its term. We also observe that if the urbanization increases by 1%, then the ruling party can expect 12.8% increase in its seats. Finally, we got a statistically significant impact of government discretionary grants on the results of state level elections. However, the magnitude is quite small. Thus, if grants increase by 1%, the incumbent state party may expect 0.007% increase in its seats. Additionally, if we consider the signs and the magnitude of the regression coefficients, without worrying too much about the p-values, we can say that life expectancy and literacy rates do have an impact on electoral outcomes.

According to the results of binary outcome models summarized in Table 8, we can state that if the economic growth rate increase by 1% during the governing period, the probability of being re-elected for the national ruling party increases by 0.4 to 0.8% and for a subnational ruling party it increases by 5 to 8%. Also, if the grants increase by 1%, the re-election probability of the national governing party does not increase, while that of the state governing party increases by 0.5 to 1%.

Table 8: Empirical estimation results of binary outcome models (1952-2014)

	National level elections					State level elections				
	Logit FE	**Logit RE**	**Logit PA**	**Probit RE**	**Probit PA**	**Logit FE**	**Logit RE**	**Logit PA**	**Probit RE**	**Probit PA**
NSDP	0.02585	0.01214	0.00875*	0.00625	0.00412*	0.05519	0.080**	0.077**	0.047**	0.0458**
	(0.76)	(0.37)	(1.80)	(0.31)	(1.75)	(1.49)	(2.11)	(2.13)	(2.20)	(2.21)
Grants	0.00404	0.00441	0.00439	0.00253	0.00253	0.00867	0.010*	0.009*	0.006*	0.005*
	(0.93)	(1.05)	(1.05)	(1.04)	(1.00)	(1.51)	(1.72)	(1.71)	(1.70)	(1.68)
Rural population	-0.801*	-0.44252	-0.40785	-0.26046	-0.23792	-0.40414	0.07166	0.08704	0.03742	0.04632
	(-1.66)	(-1.48)	(-1.42)	(-1.42)	(-1.37)	(-0.92)	(0.20)	(0.27)	(0.17)	(0.24)
Deficit	0.00026	0.00024	0.00023	0.00015	0.00015	-0.0005	-0.00044	-0.00043	-0.00028	-0.00027
	(0.75)	(0.72)	(0.71)	(0.70)	(0.70)	(-0.88)	(-0.79)	(-0.78)	(-0.81)	(-0.85)
Life expectancy	0.9**	0.773*	0.74444	0.463*	0.44568	0.9**	0.62566	0.58092	0.39884	0.37439
	(2.00)	(1.70)	(1.64)	(1.68)	(1.62)	(1.76)	(1.19)	(1.20)	(1.24)	(1.26)
Literacy	0.35476	0.49767	0.50009	0.27002	0.27259	-0.94065	-0.7937	-0.763	-0.46597	-0.45497
	(0.67)	(0.95)	(0.97)	(0.88)	(0.89)	(-1.23)	(-1.14)	(-1.15)	(-1.12)	(-1.16)
Constant		-0.013*	-0.013*	-008*	-0.779*		-0.007	-0.007	-0.004	-0.004
		(-1.80)	(-1.89)	(-1.77)	(-1.87)		(-0.84)	(-0.86)	(-0.86)	(-0.90)
Obs.	116	116	116	116	116	114	114	114	114	114
Chi2	10.05	6.60	6.22	6.71	6.07	14.87	11.37	11.60	12.96	12.91

t-stat/z-stat are given in the parenthesis

*p<0.1, **p<0.05, ***p<0.01

All the independent variables are in the first lags.

NSDP is per capita real NSDP growth rate (y/y), Grants is the growth rate (y/y) of government total discretionary grants to the state, Rural population is the growth rate of the rural population, Deficit is the growth rate (y/y) of the states` budget deficit, Life expectancy is the change (y/y) in the life expectancy rate, Literacy is the change (y/y) in the literacy rate.